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UNCONSIDERED MECHANISMS RESPONSIBLE FOR MAINTAINING THE STABILITY OF THE INTERNAL ENVIRONMENT*

THE TISDALL ORATION

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MAY I SAY AT ONCE how sensible I am of the honour you have done me in asking me to give the inaugural lecture in memory of Frederick Tisdall. I do not, of course, know why your choice fell upon me. I would like to think that it was mainly because I had been a humble disciple of Tisdall in my studies of pædiatrics, nutrition and the body fluids, all of them subjects to which he had made important contributions.

I have not come all the way across the Atlantic to tell you about some discovery interesting mostly to myself in one of the ever more highly specialized corners of medicine. There are all too many people today only too able to do that. I have rather selected a theme in which I believe Frederick Tisdall himself would have been keenly interested, and on which I have myself expended a great deal of thought.

THE WIDER VIEW

Most medical physiologists, if asked to state how the stability of the *milieu intérieur* was maintained, would unhesitatingly reply "by the activities of the kidneys and lungs". While this is perfectly true so far as it goes, several other organs are now well recognized to participate, and those who would understand the processes of regulation must take a wider view. It has been known since the time of Claude Bernard that the liver participates extensively in maintaining the concentrations of glucose within physiological limits, and this organ is also responsible for regulating the levels of some of the serum proteins (Alagille, 1956). Ductless glands like the suprarenal cortex and the posterior pituitary are involved in the production of hormones which regulate the volume of the serum and its osmotic pressure. These operate mainly through the medium of the kidney, and their interaction with it has been extensively investigated both in health and disease. It would now appear, however, that some of these systems must be extremely complicated (Graber, Beaconsfield and Daniel, 1956) and other specialized organs and possibly even enzyme systems may play a vital part in homœostasis by destroying these hormones once their physiological effects have been achieved (Chart, Gordon, Helmer and Le Sher, 1956). Still other tissues must be concerned with regulating the serum concentrations of the microelements like zinc and iron, hormones, vitamins and the like, which are present in amounts quantitatively small but physiologically important. Apart from the specialized organs, many of the cells of the body, notably the muscle cells and the erythrocytes, seem to be vitally important in stabilizing the pH and chemical structure of the serum. This has been elegantly investigated by Pitts, Elkinton and their associates (Pitts, 1954; Swan, Pitts and Madisso, 1955; Schwartz, Orning and Porter, 1955; Elkinton, Singer, Clark and Barker, 1953; Elkinton, Singer, Barker and Clark, 1953; Singer, Clark, Barker, Crosley and Elkinton, 1955; Elkinton, Singer, Barker and Clark, 1955), and the realization of this fact introduces a new thought into the whole subject, for the extracellular fluid can no longer be regarded as "protecting" the muscle cells or the erythrocytes from changes induced by the appearance of acids or alkalis in the circulation. The shoe is on the other foot, so to speak. Other cells probably participate to some extent in these reactions, although possibly those of the central nervous system do not. Any one of these

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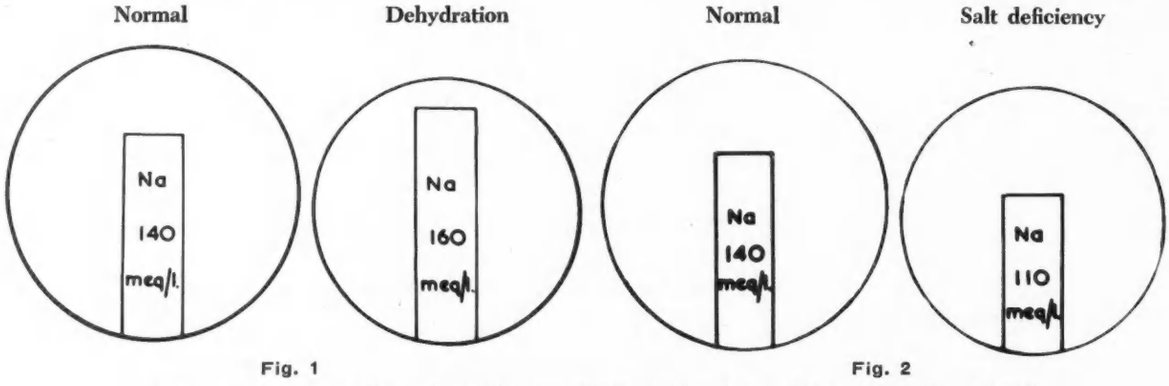

Fig. 1 Fig. 2

Fig. 1.—Dehydration: the volume of extracellular fluid reduced, the concentration of sodium raised. Fig. 2.—Salt deficiency: the serum sodium greatly reduced, the extracellular fluid volume also reduced. The circles represent qualitatively the volumes of the extracellular fluids, the blocks enclosed in them the concentrations of sodium ions in these fluids. The same conventions have been employed in the construction of Figs. 3 and 9.

aspects of control would provide material for a lecture, indeed for many lectures, but I do not intend to speak of them, for I shall have more than enough to say about other mechanisms with which I have had more practical experience, and which have got immediate applications in clinical medicine.

Thirst and Taste

Appetite is the result of a very diverse set of stimuli and sensations, among which must be numbered those of thirst and taste. It is seldom realized how important they are in maintaining the stability of the internal environment, although the facts have been known for many years.

Fig. 1 represents a departure of the concentration of serum electrolytes and of the volume of the extracellular fluids from normal, which must be well known to you. The volume is reduced and the concentration of electrolytes raised. This can be brought about in various ways by disease, but it is also one of the departures from the "normal" to which men and women are liable in the course of their daily activities. It is in fact the usual result of bodily activity on a hot dry day or mountaineering above 20,000 feet. With volume reduced and sodium concentration raised the kidney is so organized that it excretes a hypertonic urine with a very low volume, and will continue to do this indefinitely, but no correction of the abnormality is possible without the operation of the function of thirst, for without full replacement of the missing water the kidney is powerless to correct the departure from the normal. This abnormality, its causes, extents and effects were well investigated during the second world war and after it by Adolph and others (1947); Pitts, Johnson and Consolazio (1944) and McCance and Young (1944 a, b)—see also Editorial (1956 a). Animals have also been investigated (Holmes and Gregersen, 1950) with rather similar results. The important points which were brought out by all the experiments were (1) the normal man's sensation of thirst is seldom sufficiently keen to make him drink enough water to maintain himself in full hydration during a working day in the desert, (2) the resulting dehydration leads to considerable loss of efficiency and even to collapse, (3) the amount which men do drink depends upon whether water is readily available or not, whether it has a good taste and a satisfactory temperature. These are all matters of great practical importance to anyone in charge of troops, and the experimental results have not achieved the recognition they deserve. In European mountaineering, for example, it is still the rule among guides and instructors to discourage drinking during the day's expedition. Although tolerated without much discomfort by adults, this advice is certainly unphysiological. Children object to it very much, for they seem to become thirsty more quickly than adults do, and their mental concentration and efficiency fall off correspondingly rapidly, as anyone must know who has taken children out for an expedition on a warm day. Unrecognized dehydration is one of the great dangers in high altitude mountaineering. It is partly due to the deep and rapid breathing necessitated by the low oxygen tension and partly to the difficulty of obtaining water, and there is little doubt that

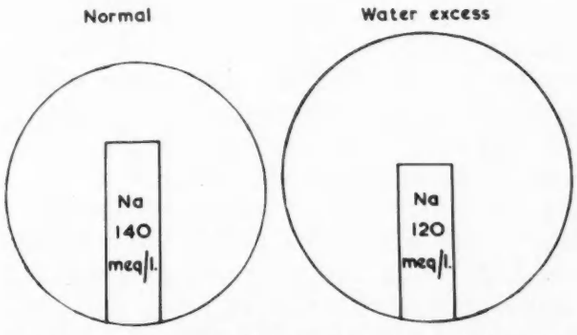

Fig. 3.—Water in great excess: the volume of the extracellular fluid expanded, the concentration of sodium reduced. The circles represent qualitatively the volumes of the extracellular fluids, the blocks enclosed in them the concentrations of sodium ions in these fluids. The same conventions have been employed in the construction of Figs. 1, 2 and 9.

it has led to the failure of some of the assaults on the Himalayan giants. Elaborate instructions and provisions for ensuring full hydration were provided for all personnel on the successful attempt on Everest in 1953.

In the early stages of a deficiency of salt unaccompanied by one of water the kidney maintains the osmolar concentration of the extracellular fluids within normal limits although their volume is allowed to fall. In the later stages, however, there is a profound fall in the concentration of the electrolytes as well as a fall in the volume of the extracellular fluids. Fig. 2 illustrates this well-known departure from the normal "make-up" of the composition and volume of the extracellular fluids. It can be brought about in many ways, and is the syndrome which gives rise to stokers' cramps and miners' cramps in healthy working men. It has been caused in these men by a failure of their taste for salt to make them take enough to cover the amounts they have lost in the sweat. It can only be put right by the kidney after the ingestion or transfusion of sufficient salt and water. The correction of these abnormal states is everyday practice in the wards today, but I often wonder whether primitive man would have turned over so successfully from hunting to agriculture, particularly in the hotter parts of the world, had he not had a liking for salt and found it added "savour" to his food.

Conflicting and Synergic Renal Functions

Broadly speaking, the kidney has two main functions—the regulation of the composition and the regulation of the volume of the extracellular fluids. These functions embrace many subsidiary ones such as the regulation of the pH and osmotic pressure. When a person in full hydration and osmotic equilibrium takes a large amount of water, two-thirds of the added "load" probably passes into the cells, and this incidentally is another good example of the way in which the cells participate in regulating the stability of the fluids outside them (*vide ante*). Nevertheless, the extracellular fluids become hypotonic and their volume goes up (Fig. 3). This brings about no conflict of renal function, for the kidney corrects both departures from the normal simultaneously through the agency of the posterior pituitary by excreting the excess of water with a trifling amount of salt.

When, however, the body becomes sodium deficient and the intake of water is maintained, two functions of the kidney come into conflict, for the maintenance of osmotic pressure and the restoration of volume are mutually incompatible, and the response of the kidney is a compromise. All the salt in the glomerular filtrate is reabsorbed, and consequently none is excreted, but water is also reabsorbed in excess of the normal osmotic requirements of the body, and consequently volume is preserved—to some extent at any rate—at the expense of osmotic pressure (Fig. 2). If water is taken by mouth by people in this state, it is not excreted with the usual despatch and efficiency. This was demonstrated long ago (McCance, 1936 a, b) and has frequently been confirmed; yet it is impossible to increase the volume of the extracellular fluids permanently without salt, and the kidney will in time re-establish the "steady state" of compromise which was disturbed by the draught of water. It is possible that this reabsorption of water in excess of the normal osmotic requirements of the body is mediated through the posterior pituitary and the antidiuretic hormone, actuated by some volume receptor in the central nervous system, or elsewhere (Robinson, 1954), but the mechanism is not yet known, and has certainly not been satisfactorily explained.

Salt deficiency brings out another example of conflicting renal functions which was discovered many years ago now, and which has been rather satisfactorily explained by more recent work. Overbreathing makes the body alkaline, and the usual response of the kidney to this is to excrete *more* sodium and *more* potassium and in this way to produce an alkaline urine, and thus to correct the departure from the normal pH of the body occasioned

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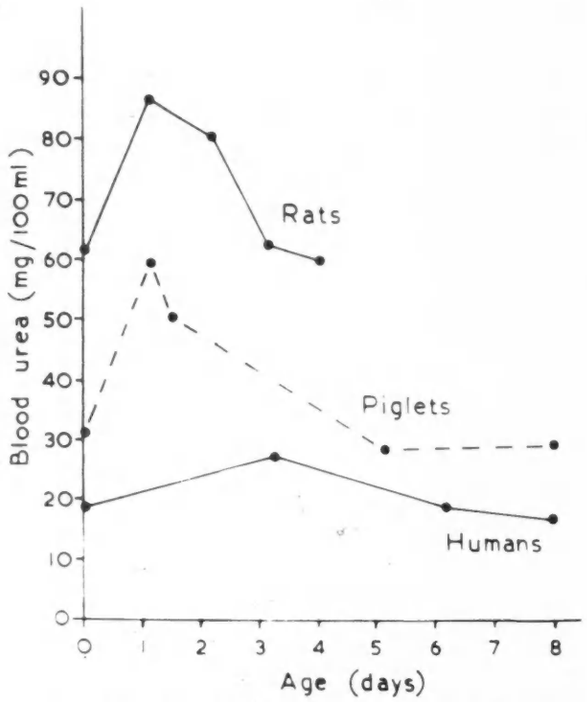

Fig. 4.—Changes in the concentration of urea in the blood during the early days of life.

by the overbreathing. Salt deficient persons, however, excrete no sodium, and when we overbreathed during extreme salt deficiency no sodium appeared in the urine, and no more potassium was excreted (McCance and Widdowson, 1936). We "explained" this very crudely at the time by saying that when the body was made alkaline by overbreathing during salt deficiency the kidney preferred to regulate the osmotic pressure of the body rather than the pH. It is now thought that the regulation of pH is brought about mainly by the activities of the distal tubule and takes place as follows. Sodium ions which have not been reabsorbed in the proximal tubule pass on with an equivalent amount of "fixed" anions, which will not be reabsorbed. At the normal pH of the body some of these sodium ions are reabsorbed in the lower parts of the tubules, and an equivalent quantity of hydrogen and potassium ions find their way into the tubule in exchange (Berliner, Kennedy and Hilton, 1950; Berliner, Kennedy and Orloff, 1951; Robinson, 1954). In an alkalosis unaccompanied by a sodium deficiency there are fewer hydrogen ions to be exchanged, and consequently an increased excretion of sodium ions is observed. In extreme salt deficiency all the sodium ions in the glomerular filtrates are assumed to be reabsorbed in the upper parts of the tubules so that none are left to be reabsorbed in the lower parts. If now an alkalosis is created by overbreathing, (a) there can be no reabsorption of the sodium ions which, in the absence of a deficiency or an alkalosis, would have been exchanged for hydrogen—and consequently no *increased* excretion of sodium can be observed in the urine; (b) no increased excretion of potassium can be observed because again there are no sodium ions to be reabsorbed in exchange (Stanbury and Thomson, 1952). If this explanation is the correct one, the kidney of a salt deficient person may be found to excrete no more hydrogen and ammonium ions in response to an acidosis, but this so far as I am aware has not yet been investigated.

Food, Growth and Protein Catabolism

"La fixité du milieu intérieur" in the newborn has been one of my interests for many years. As you probably know, even in normal breast fed infants the blood urea rises in the first day or two of life, and a similar rise seems to take place in animals. We have ourselves investigated it in the rat, the pig and man (Fig. 4), and found that this rise was followed by a fall. This suggested that the function of the kidney underwent rapid maturation in the first few days of life, but our attempts to find out the causes in rats were not very successful. A study of the metabolism and renal function of starving human infants was our next move. This emphasized how low the urea clearance might be under these conditions (Fig. 5), but it also brought out the fact that normal infants derived only 4% of their basal calorie requirements from tissue breakdown, whereas adults suffering from a similar degree of starvation and hydropenia derived

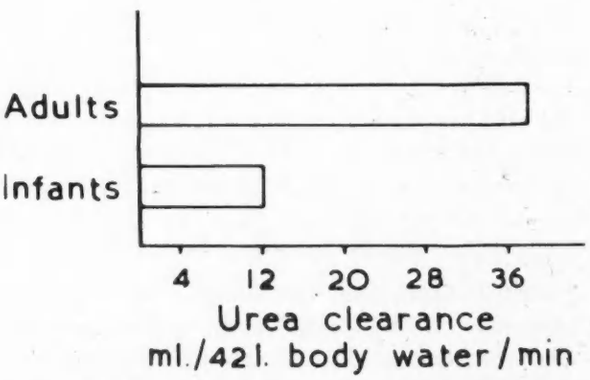

Fig. 5.—The urea clearances of normal full-term infants and of adults under comparable conditions of starvation and dehydration.

nearly 20% (Fig. 6). Had the infants not broken down so little tissue protein, their blood ureas would undoubtedly have gone up much higher than they did. Subsequent work showed that the catabolism was low whether the infants were fed or starved, and the great preponderance of anabolism over catabolism at this age is quite evidently one of the factors concerned in maintaining the concentration of urea in the body fluids within normal limits. Were the ratio between anabolism and catabolism the adult one, the kidneys would be unable to do so.

A chance decision to study a baby whose mother had had a prolonged and difficult labour led to the further discovery that such infants tend to break down much more than the normal amount of tissue protein in the first 48 hours of life (Fig. 7). Here then was one possible cause for some of the high blood ureas which have been encountered at this age and attributed solely to defective renal function or left unexplained. Snelling (1943), for example, described several babies aged from one to four days who had been born only after prolonged and difficult labours and were found on admission to hospital to have high values for the non-protein nitrogen in the serum. Jonsson (1951) published a description of three infants who were in his opinion suffering from lower nephron nephrosis following asphyxia neonatorum. The author's findings make this rather an unsatisfactory diagnosis (see McCance and Widdowson, 1954), and there is little doubt that the protein breakdown of these infants was highly abnormal. Campbell and Dales (1952) described a baby with sclerema neonatorum who was found to have a blood urea of 900 mg./100 ml. on the seventh day of life and histologically normal kidneys after his death on the eighth day. The authors went into the question of how to account for this high figure even with completely functionless kidneys, but did not consider abnormal tissue destruction. This may have been the explanation, but an alternative one will become apparent in a few minutes.

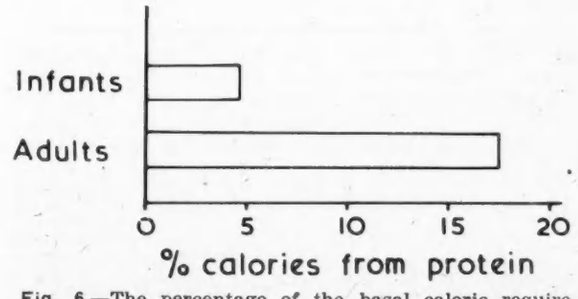

Fig. 6.—The percentage of the basal caloric requirements during starvation and hydropenia derived from protein breakdown.

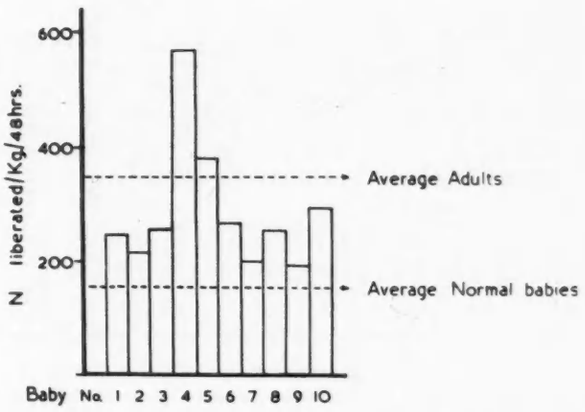

Fig. 7.—The protein catabolism of "distressed" babies during the first two days after birth.

If an animal is growing, some of the material in its food is incorporated into the structure of its tissues and does not, therefore, present itself for excretion by the kidney. We had always appreciated that this must relieve the kidney of the newborn animal of some of the work which it was called upon to do in adult life, and therefore help the immature kidney of the newborn toward maintaining the blood urea within normal limits. The possibilities of this in the newborn infant, however, were brought home to us by the discovery that the starving newborn infant broke down so much less tissue protein than a starving adult. The human infant moreover grows relatively slowly. A fast growing animal might be expected to show up the effects of growth even more clearly. We chose the pig for this investigation (McCance and Widdowson, 1956) as we knew the rat was likely to present great technical difficulties. Three piglets of about the same weight were selected from each litter at birth and fed every two hours for about 40 hours by a stomach tube. Their urines were collected quantitatively in metabolism cages. One of the three piglets was given sow's milk, a second the same volume of a mixture of evaporated cow's milk and pig serum, the third nothing but an equal volume of water. There was little to choose between the level of urea in the blood brought about by these regimens. The reasons for this were:

1. Although the protein in the food provided 3,500 mg. of amino acid N/kg./day, 90% of this was incorporated into tissue protein and only 10% of it appeared in the body fluids as urea

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TABLE I.

The Nitrogen Balances of Newborn Piglets Which Were "Fed" or "Not Fed"

	Animals given: Milk or milk mixtures	*Water*
N intake (mg./kg./24h.)	3500	0
N output "	350	250
N "balance" "	+3150	−250

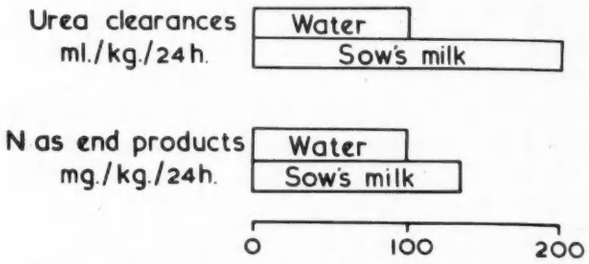

Fig. 8.—The effect of food—as distinct from water—on the urea clearance and nitrogen appearing as end products of protein metabolism. The food contained 3,500 mg. of protein N/Kg./24h. The value on water alone equals 100.

and required to be excreted if the concentration in the body fluids was to remain the same. Table I shows the nitrogen balances of piglets which were fed or not fed, and the capacity of these animals to grow when they were given a satisfactory diet is clearly shown by the colossal positive balances which were obtained. Much more of the protein nitrogen in the food would undoubtedly have appeared as urea if the food had not contained a satisfactory mixture of amino acids, and almost all of it—or at any rate an equivalent amount—would have appeared as urea in the body fluid of an adult. This emphasized the extreme importance of growth in the regulation of the stability of the internal environment and also how necessary it is to have a satisfactory mixture of amino acids in the diet of a newborn animal. Some dislocation between appetite and growth was probably the reason why Campbell and Dales's (1952) baby had a blood urea of 900 mg. on the seventh day of its life in spite of perfectly normal kidneys. It was certainly the cause of the "uræmia" which Schultze and his co-workers reported in newborn rats (Schultze, 1949; Schultze and Halvorson, 1949). If, moreover, the capacity of an infant for growth is absent or has failed, tube feeding could raise the level of urea in the body fluids to very high levels—and may very well have done so without its being recognized.

2. Some ingredient in the piglets' food, almost certainly the protein, led to the hypertrophy of their kidneys, and a small increase in the urea clearances. This was enough to excrete the nitrogenous end products of the small percentage of the dietary protein which underwent catabolism (Fig. 8). Both effects were definite, but small, considering the relatively enormous amount of protein nitrogen in the food.

The human infant as you know has a much lower Na and Cl clearance than an adult, and we have found that if there is too high a concentration of these mineral elements in the fluid food administered their retention follows, and high values of Na and Cl may be found in the serum. The mixture of evaporated cow's milk and pig serum contained about 0.5% of sodium chloride, which was a higher concentration than that in sow's milk, and the responses of the piglets to which it was given may be summarized in the following way. (1) The concentration of Na and Cl in the serum rose to an abnormal level. (2) The piglets retained more Na and Cl than could be accommodated in the extracellular fluids without a considerable expansion in their volume. (3) This took place—as shown by a large gain in weight (Table II). These animals, therefore, had been forced into a state of hypernatræmia coupled with an expansion of the extracellular volume (Fig. 9). Owing to the immaturity of their kidneys, they were unable to excrete a high concentration of salt in the urine and consequently to control either the osmotic pressure or the volume of the extracellular fluids. This syndrome must be uncommon and difficult to produce in a healthy adult animal, although something of the kind seems to have been met with in the wards (Black, 1952). It would almost certainly be corrected by a normal man in his usual environ-

TABLE II.

The Sodium Balances and Serum Levels and the Gains in Weight of Piglets Given (A) Sow's Milk (B) an Equicalorific Mixture of Cow's Milk and Pig's Serum

	(A) *Sow's milk*	(B) *Evaporated milk mixture*
Na balance mg./kg./24h.	+163	+442
Serum Na mEq./litre	149	171
Gain in weight g./kg./24h.	+89	+177

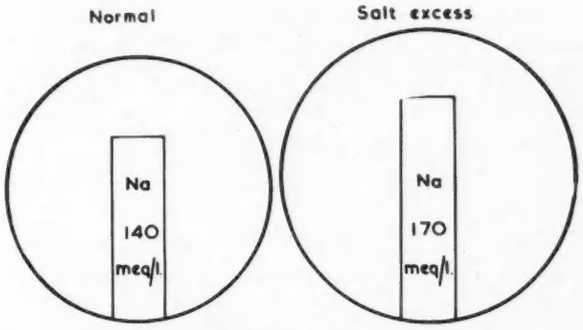

Fig. 9.—The serum sodium raised with expansion of the extracellular fluid. The circles represent qualitatively the volumes of the extracellular fluids, the blocks enclosed in them the concentrations of sodium ions in these fluids. The same conventions have been employed in the construction of Figs. 1, 2 and 3.

ment by the stimulus of thirst calling for further expansion of the extracellular fluids until their osmolar concentration became normal. The reduction and restoration of their volume would follow. By a small reduction in the salt intake of these piglets it is likely that this abnormality in the internal environment could have been maintained indefinitely as a "steady state", probably to the great disadvantage of the growing organism. We came up against what I believe to have been this syndrome some years ago (see also Aldridge, 1941) when we were attempting to feed premature infants on amino-acid mixtures which had been made by hydrolysis of the parent protein with hydrochloric acid followed by neutralization with soda. Correction did not take long once the salt intake had been reduced, but the steps in the process were not investigated. The syndrome is not at present a well-recognized one; it is not discussed by either Finberg and Harrison (1955) or by Weil and Wallace (1956). It may be a new one, and its genesis will certainly have to be explored. Its origin is likely to turn out to be part and parcel of the mechanism underlying the large extracellular volume in infancy, but at present an excess of aldosterone in the circulation does not appear to be the cause, for in adults, at any rate, such an excess generally presents as a potassium deficiency (Conn, 1955; Editorial, 1956 b).

These experiments may turn out to be of importance in connection with the interesting new clinical syndrome of persistent hyperelectrolytæmia in infants coupled with diabetes insipidus and a failure of the kidneys to respond to posterior pituitary hormone. This was first described by Waring, Kajdi and Tappan (1945) and accounts of the literature up to about a year ago have been given by Luder and Burnett (1954), Kirman, Black, Wilkinson and Evans (1956) and particularly by Macdonald (1955). The babies get dehydrated and their primary lesion is almost certainly a failure to reabsorb *water*, but when their serum sodium and chloride are normal they appear to reabsorb a very high proportion of the sodium in their glomerular filtrates. I heard an excellent account of this syndrome given by Dr. Winifred Young at a meeting of the British Pædiatric Association shortly before I left England, and of the successful way in which these children's internal environments could be maintained within normal limits by low electrolyte diets and the infants thus given an entirely new lease of life.

Whether or not there is any fundamental connection between our syndrome of hypertonic œdema and the new clinical syndrome, both provide clear proof that the composition of the food is a prime factor in regulating the stability of the internal environment in the newborn animal. It is a factor seldom taken into account, but it is an extremely important one, particularly in fast growing animals like the rat which appear to have such rudimentary renal function at, and soon after, birth. It should always be in our minds when we accept the responsibility of giving the newborn child or animal a food which it will not accept by the usual channels, or which has not been provided for it by nature.

I never had the good fortune to hear Frederick Tisdall speak, and I am sure he would have made the dry bones of these matters live with the wealth of his clinical and wartime experiences. I am very conscious of my limitations, but I hope I have been able to provide you with some new thoughts on old topics which you may be able to apply in some field of practical medicine.

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CERVICAL LYMPHADENITIS IN CHILDREN CAUSED BY CHROMOGENIC MYCOBACTERIA*

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INTRODUCTION

INTEREST IN THE pathogenic significance of chromogenic acid and alcohol-fast rods has recently been increased through further reports of their isolation from human infections. In the past, strains from this group of microorganisms have been described on numerous occasions from a wide variety of sources such as plants, reptiles, and warm-blooded animals, including man. Many of the strains reported from human sources have shown markedly pigmented colonies, and some though not all of them have been considered to be saprophytic.[1-6] Since the role of these microorganisms in the pathogenesis of the lesions from which they have been isolated is not always established, we are contributing a study of 14 strains of chromogenic acid-fast and alcohol-fast rods, 10 of which were obtained in pure culture from pus aspirated from suppurating facial, submaxillary or cervical lymph nodes in children in whom the clinical picture suggested a tuberculous infection.

Previous investigations of the classification, cultural characters and pathogenicity of the group of chromogenic acid-alcohol-fast rods have been referred to in a comprehensive study presented by Tarshis and Frisch in 1953.[7] They contribute informative details on the cultural, pathogenic, and hypersensitivity-inducing characters of a collection of 26 chromogenic strains obtained by several workers from sources which include for the most part sputum, lung abscess and gastric lavage specimens.

Since the above paper appeared, there have been other reports of isolation from diseased tissues[12, 13, 16, 17, 21-23, 25, 36] and some studies on the growth and metabolic characteristics.[14, 15]

DERIVATION OF STRAINS

Series 1. Ten strains of the present study have been isolated from pus aspirated from facial, submaxillary or cervical lymph nodes in young children.

*526 CMH.**—1½-year-old female had a dark red preauricular swelling for five months. Radiograph of lungs normal. Oral BCG at birth. No family history of tuberculosis. Lymph node not excised. Aspirated pus grew yellow pigmented colonies of acid-fast and alcohol-fast rods on Löwenstein's medium at 37° C.

1356 CMH.—3-year-old male in good health until he developed a painless, red, soft lump on the right side of the neck, three months before admission. Received oral BCG at birth; positive patch test; negative chest radiographs. No family history of tuberculosis. Acid-fast rods found on direct smear of aspirated pus, and yellow pigmented colonies grown slowly on Löwenstein's medium at 37° C.

1637 CMH.—3-year-old boy with right-sided mandibular fluctuant swelling. Patch test positive; no BCG vaccination; chest radiograph normal. No family history of tuberculosis. Lymph nodes aspirated but not removed, and acid-fast rods appeared in cultures on Löwenstein's medium after five weeks' incubation at 37° C.

2465 CMH.—7-year-old boy with four weeks' history of right-sided mandibular and cervical lymph node swelling. Patch test, negative two years before, had become positive. No BCG; chest radiograph normal;

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*CMH—The Children's Memorial Hospital, Montreal, now The Montreal Children's Hospital.

no family history of tuberculosis. Pus aspirated from lymph node showed few acid-fast rods, which grew in four to five weeks as yellow pigmented colonies on Löwenstein's slopes at 37° C. Guinea-pigs inoculated with pus developed no lesions in three months. Histological picture of lymph node excised from patient described as compatible with fibro-caseous tuberculosis with beginning infiltration into subcutaneous tissues.

3327 CMH.—2-year-old boy with chronic otitis media and right preauricular adenitis of subacute type. Patch test weakly positive; no BCG; chest radiograph showed peribronchial infiltration. Patient's father found to have active tuberculosis. Lymph nodes aspirated and later excised. Occasional acid-fast rods found in pus on both occasions, and slow growth of bright yellow colonies on Löwenstein's slopes at 37° C. Guinea-pigs inoculated with pus showed no lesions in three months. Histological picture of excised node reported as compatible with a tuberculous infection.

*623 RVH.**—3½-year-old female, with a lump the "size of a walnut" in right cervical region for one month. Skin over the area became reddened; Mantoux test positive 1 in 1,000; BCG vaccination unknown. Radiographs of chest negative. Smear of pus aspirated from node showed one acid-fast rod. Several pigmented colonies of acid-fast rods grew in five weeks on Löwenstein's slopes. Histological report on patient's lymph node noted tuberculous caseation, giant cells and chronic inflammatory cells.

3536 HSCT.†—Female child with unopened cervical node swelling and positive O.T. reaction. Pus aspirated showed no acid-fast rods, but orange pigmented colonies developed on media used for isolating *Mycobacterium tuberculosis;* guinea-pig inoculation negative in three months' time.

4333 HSCT.—Female child with unopened cervical node swelling and positive Mantoux reaction. Aspirated pus showed no acid-fast rods but they grew slowly as orange-yellow colonies. Guinea-pig inoculation negative at three months.

5099 HSCT.—Male child with cervical node swelling and positive tuberculin test. Brother and great aunt said to have had tuberculosis. Node excised unaspirated, and pus showed many acid-fast rods. These grew slowly in orange pigmented colonies on Löwenstein medium. Guinea-pigs inoculated with culture showed a few caseous lumbar nodes in which acid-fast rods were seen by smear and grown in culture as pigmented colonies. Histologically, the lymph node appeared tuberculous, though numerous polymorphs were present.

8053 HSCT.—Female child with closed cervical node swelling and positive tuberculin test. Smear of aspirated pus showed two acid-fast rods after prolonged search. Cultures grew acid-fast rods in yellow-orange pigmented colonies. Guinea-pig inoculation negative.

Series 2. Two strains isolated from pus aspirated from the pleural cavity.

185 RVH.—Adult male with chronic cough and weight loss of 35 lb. in five months. Empyema of left chest operated upon; pus removed grew smooth, orange-yellow colonies of acid-fast rods on Löwenstein medium. Biopsy of pleura showed no histological evidence of tuberculosis or malignant disease. Patient's condition improved and he was discharged.

1540 RVH.—Adult male with staphylococcal empyema. Acid-fast rods not seen on direct smear, but yellow pigmented colonies of acid-fast rods grown in 3 weeks on Löwenstein slopes. Patient regarded as cured by antibiotic therapy and strain considered to be a contaminant.

Series 3. Two strains isolated from open lesions.

8829 HSCT.—Female child, old poliomyelitis patient, with negative tuberculin reaction. Bronchial fluid, obtained at bronchoscopy, grew acid-fast rods in deep orange-yellow, rough colonies on medium for isolation of *Myco. tuberculosis.*

4344 CMH.—9-year-old female suspected of having tuberculosis of the knee joint. Tuberculin test positive; no BCG; chest and joint radiographs suggestive of tuberculosis. Father proven to have tuberculosis and mother suspected but not investigated. Scrapings of tissue from joint lesion grew acid-fast rods in yellow pigmented colonies on Löwenstein slopes together with typical *Myco. tuberculosis.* Tissue sections revealed a histological picture compatible with tuberculosis.

Since a preliminary report on these 14 strains was made in December 1951,[39] an additional 15 apparently similar strains have been recovered in pure culture from facial or cervical lymph nodes.

HISTOPATHOLOGY OF THE LYMPH NODES

The following description and comment on the histological appearance of the lymph nodes which have been excised from these patients at the Children's Memorial Hospital* is contributed by Dr. F. W. Wiglesworth, Director of the Department of Pathology.

"The gross and histological lesions of the resected lymph nodes in eight children could not be differentiated from those of tuberculosis. Tubercle formation, necrosis, caseation, granulation tissue, scarring and calcification were all seen, depending on the stage of the process. Numerous macrophages and multinucleated giant cells were present in most instances. Furthermore, in some instances the disease, like tuberculosis, had spread to form subcutaneous necrotic and caseous abscesses with involvement of the skin.

"The only finding of interest was the presence of Schaumann bodies in occasional multinucleated giant cells. These were found in the routine sections of the surgical specimens from five of the eight patients. These bodies are stated to be rarely, if ever, seen in unequivocal tuberculosis but whether their presence in the lesions

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produced by chromogenic acid-fast organisms is of diagnostic significance, or not, is unknown."

There follows a brief summary of the morphological, cultural and biological characters of the strains. A detailed account is to appear in a separate paper in the *Canadian Journal of Microbiology* (February, 1957).

MORPHOLOGY AND STAINING PROPERTIES

Short rods when found on direct smear from lesions, granular, often filamentous on milk medium, cords inconstant (Dubos' medium); no branching demonstrated; acid and alcohol fast, resisting 10 minutes' exposure to acid and alcohol and some resisting one hour's exposure.

Colony appearance.

On primary isolation bright yellow colonies appeared between the fourth and fifth week on Löwenstein slopes at 37° C. and the colour deepened with age. Colonies were 1-2 mm. in diameter, smooth, convex and opaque and emulsified easily in normal saline to give an homogenous suspension; two of the strains were rough, however. Growth on streak subcultures appears in 10-14 days, tends to be confluent and becomes papillate on further incubation.

Optimum temperature.

Optimum temperature 37° C.; growth also occurs, but more slowly, at room temperature; no growth at 47° or 50° C.

Oxygen requirements.

Growth best under ordinary atmospheric pressure; can grow under 15% CO_2 but more slowly than under atmospheric pressure; no growth obtained under anaerobic conditions, except for one strain.

Resistance to heat.

Ten out of 14 resist one hour's heating at 56° C.; six out of 14 resist 30 minutes' heating at 60° C.

Growth requirements.

Optimum growth on egg media, Bordet-Gengou slopes and Dubos' fluid medium; scanty growth on peptone agar; scanty growth or no growth on Löffler's serum; 11 out of 14 utilize paraffin as a sole source of carbon (paraffin-coated rod in Czapek base medium); no phenol tolerance (0.5%).

Biochemical characters.

Sugars not fermented; gelatin not liquified, indol not formed; nitrates not reduced to nitrites except for one strain.

In vitro tests for appreciation of virulence.

Neutral red test: negative in 13 strains out of 14.
Para-aminosalicylic acid: one inhibited by 1 mcg., five inhibited by 10 mcg., four inhibited by 100 mcg., four inhibited by 1,000 mcg. of PAS per ml.

PATHOGENICITY

Each strain was inoculated into four guinea-pigs, three or four hamsters, four rats and two hens; hens were inoculated by the intravenous route, half the smaller animals were inoculated subcutaneously and the other half intraperitoneally. Skin tests were made prior to inoculation and two months afterwards using human and avian old tuberculin (O.T.) and an extract prepared from the homologous chromogenic strain; only animals showing negative reactions to all materials on primary testing were used for inoculation.

The animals were kept under observation for a period of three months, at which time the survivors were sacrificed; those dying during this period as well as the sacrificed ones were autopsied, smears were made from any lesion found and cultures to recover the strain were attempted when sufficient material was available.

Localized lesions were consistently produced in guinea-pigs inoculated intraperitoneally with the strains isolated from cervical lymph nodes; one of the guinea-pigs inoculated with the strain isolated from material obtained by bronchial aspiration showed an abscess at the site of inoculation but no lesions were produced by the strains isolated from the empyema or knee joint fluid. Generalized lesions were rarely observed and did not lead to progressive disease. Localized lesions were occasionally found in rats and hamsters inoculated with strains isolated from cervical lymph nodes; one hen showed generalized lesions of the pleura, lungs and pericardium, but no lesions were found in any other. No lesions were found in rats, hamsters or hens inoculated with the strains from other sources.

Allergic reactions were elicited in most of the guinea-pigs tested with all the chromogenic extracts except for one strain (185); positive reactions to these extracts were likewise elicited in most of the hens and in an occasional rat; hamsters showed in some instances doubtful reactions only. No response to avian O.T. was elicited in rats, hamsters and guinea-pigs; however, positive reactions were found in most of the hens. Doubtful reaction to human O.T. occurred in a few guinea-pigs, but no response was elicited in rats or hamsters; hens were not tested.

DISCUSSION

It has been suggested that unusual strains of acid-alcohol fast rods have been more frequently isolated since the introduction of streptomycin treatment of tuberculous conditions[27] but it is doubtful that the antibiotic has any connection with the incidence of isolation of these chromogenic microorganisms, for they were described long before streptomycin was available and are now isolated from patients who have

never received this drug, as was the case with our 10 strains from lymph nodes. It is more likely that they are found with greater frequency now because the number of cultures for isolation of *Myco. tuberculosis* has increased during the last decade, with less reliance placed on direct smears for diagnosis. Reference can be made to various reports on this subject.[1, 7, 10, 14, 23-26]

The significance of such findings has to be evaluated as to taxonomic position and as to pathogenicity.

1. Discussion of the Cultural and Biological Characters

Acid-fastness and alcohol-fastness is not a property of one single family but of several groups of microorganisms belonging to the order Actinomycetales. This order includes the family Mycobacteriaceæ and the family Actinomycetaceæ; within this last-named family, some species of the genus Nocardia have been found to cause disease in man.[19] Our chromogenic strains differ from Nocardia. Most Nocardia show branching on culture, although some have a tendency to break up into rod-like elements in cultures, or in the tissues.[18, 19] As a rule, acid-fastness is partial in Nocardia, which do not long resist exposure to acid and alcohol. They usually grow within a few days on primary isolation and do not require any special media for their development. Branching could not be demonstrated in any of our chromogenic strains, although filamentous forms were present to some degree in all strains growing in litmus milk. However, several (3327, 1637, 4344, 8829, 4333) exhibited marked pleomorphism in this medium, showing filaments together with short coccoid rods, marked beading and spindle-shaped thickening. All strains were strongly acid-alcohol fast. They differ from *Nocardia asteroides* by their strong acid-fastness and the absence of branching; they differ from *Nocardia intracellularis* by the lack of phenol tolerance and the absence of branching.

By their morphological characteristics and their staining reactions, they belong to the Mycobacteriaceæ.

They differ from *Myco. tuberculosis* var. *hominis* in at least one of the following characteristics: ability to grow at room temperature, resistance to heat, resistance to para-aminosalicylic acid, and ability to utilize paraffin as a sole source of carbon.

Another possible explanation is that they are chromogenic variants of *Myco. tuberculosis* var. *hominis, bovis* or *avium;* such variants have been described by various authors.[10, 32-34] The characteristic of these variants is the decrease in pathogenicity for animals on experimental inoculation.

Some observations very similar to ours were published a few years ago[35] leading to the conclusion that the chromogenic strains isolated from cervical lymph nodes were pigmented strains of *Myco. tuberculosis* var. *avium.* Our studies do not allow us to draw the same conclusions because animals which showed lesions did not give any positive skin test with avian tuberculin; moreover, hens remained in good health although inoculated with large numbers of bacilli by the intravenous route; they showed, however, an allergic response to avian tuberculin.

Response of all inoculated animals to human tuberculin has been poor or absent and this has led us to support the view that they belong to a different species of Mycobacterium. They are different from the more recently described pathogenic Mycobacteria, namely *Mycobacterium ulcerans,*[23, 25] *Mycobacterium balnei,*[36] *Mycobacterium fortuitum*[21, 22] and several others[12-17] in their optimum growth temperature at 37° C. or their pathogenicity for guinea-pigs.

A last possibility to be considered is contamination of the specimen by saprophytic Mycobacteria introduced by technical error such as the use of improperly sterilized glassware; the term contaminant may be extended to include Mycobacteria normally present in certain parts of the body, such as *Myco. smegmatis* in urine or the various Mycobacteria ingested with food[24] which can be found in the gastric juice. The labelling of all findings of unusual and atypical acid-fast strains as contamination is an easy explanation but not satisfactory or necessarily true. In most of the cases described in this paper, there is no evidence that the strains isolated were introduced through technical error or represent surface saprophytes since all except two were obtained from non-fistulous lymph nodes or the pleural cavity, and in many instances were seen directly in material from the closed lesions.

If contamination is eliminated, other possibilities remain. One is the chance mixture of saprophytic and pathogenic Mycobacteria.[31] In the strains we have described, this has apparently

occurred in one instance only (4344). In no other specimen has a mixture of acid-fast bacilli been found and the chromogenic strains grew in pure culture from the lesions in man and were isolated in pure cultures from lesions experimentally produced in animals.

2. Evaluation of the Pathogenicity

All our experimental animal data, which are admittedly as incomplete as those amassed by other observers, emphasize the difficulty of evaluating with accuracy the pathogenicity of such strains. It is well to recall Pinner's[5] summary of the situation in this respect. He reminds us that the term pathogenicity is nearly meaningless unless it is strictly defined in terms of animal species, dosage, time interval between infection and pathological examination. There is, moreover, no general agreement on what constitutes disease in infected animals. "If any demonstrable tissue alterations be called disease, then any organism causing them is considered pathogenic" and "to assign the term pathogenic only to those causing progressive disease would exclude a major portion of all so-called pathogenic (non acid-fast) organisms". He suggests that the interval between infection and autopsy may be too long in experimental inoculations and that this may account for the absence of lesions in many studies with these chromogenic acid-fast strains from human and animal sources. It may well be also that the animals have not been kept long enough.

The four strains from lesions other than infected lymph nodes are difficult to correlate with the clinical picture of the patients from whom they were isolated. Tests for their pathogenicity have not been conclusive.

The remaining strains, isolated from ten children with subacute lymphadenitis, are of low-grade pathogenicity under our experimental conditions. The intraperitoneal injection of approximately 600 million organisms has consistently produced lesions in guinea-pigs, and the lesions have been observed as early as two weeks after inoculation and were present three months afterwards. These strains differ in pathogenic behaviour from *Myco. tuberculosis* in not causing progressive disease and by their lack of tendency to produce ulcerative lesions in patients as in experimental animals. Allergic response can be obtained in inoculated guinea-pigs and hens with tuberculin-like extracts of the strains, but the poor or absent response to human or avian tuberculin suggests that they possess a component of their own.

Conclusion

Because the morphology, staining characteristics, cultural behaviour and pathogenicity of these chromogenic strains differ markedly from the species of Nocardia and Mycobacterium with which they have been compared, it is suggested that they be distinguished from other acid-fast species by the name *Mycobacterium scrofulaceum* (N. sp.).

Summary

The present communication describes the source, morphology, staining reactions and the cultural, biochemical and pathogenic characters of 14 strains of chromogenic acid-alcohol fast rods isolated from pathological specimens from human infections suspected of being tuberculous in nature.

Ten of the strains were isolated from suppurating facial, submaxillary or cervical lymph nodes in children. All were closed lesions. Two strains were isolated from empyema, one from a bronchial aspiration fluid and one from tissue of a knee joint proven to be tuberculous.

Lymph nodes which were excised were declared to be histologically compatible with tuberculosis, although some differences were noted. The clinical course in these 10 patients was benign and healing occurred slowly without sinus formation.

The four other strains could not be correlated with the clinical picture of the patients from whom they were isolated and tests for their pathogenicity have not been conclusive. All strains consisted of strongly acid and alcohol fast, non-branching rods, and produced markedly pigmented colonies, their colour passing from bright yellow to deep orange. All grew best on media used for isolation of *Myco. tuberculosis*, although good growth was also obtained on a wide variety of other media; 11 of the 14 strains utilized paraffin as a sole source of carbon.

Our findings suggest that the 10 strains isolated from subacute lymph node infections in children, belong to a different species of Mycobacterium and must be considered as the actual cause of the lymphadenitis, and the name *Mycobacterium scrofulaceum* (N. sp.) has been proposed.

We would like to thank Professor E. G. D. Murray for his interest in this study and helpful advice, Dr. T. E. Roy, the Hospital for Sick Children, Toronto, for supplying five of the 14 strains, and Dr. F. W. Wigglesworth, Montreal Children's Hospital, for his courtesy in providing a description of the histopathology of the excised lymph nodes.

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RÉSUMÉ

Les auteurs présentent une étude décrivant l'origine, la morphologie, les réactions tinctoriales et les caractères culturaux, biochimiques et pathogènes, de 14 types de bacilles en bâtonnets chromogènes acido-alcoolo-résistants, isolés de spécimens pathologiques d'infections humaines qu'on soupçonnait de nature tuberculeuse. Dix de ces types furent isolés de ganglions lymphatiques suppurés des régions faciale, sous-maxillaire et cervicale chez des enfants. Toutes ces lésions étaient fermées. Deux types proviennent d'empyème, un autre de sécrétions prélevées à la bronchoscopie, et un dernier de tissu articulaire d'un genou tuberculeux. Les coupes histologiques des biopsies ganglionnaires furent trouvées à fait compatibles avec l'apparence que présente la tuberculose, bien que quelques différences furent notées. L'évolution clinique de ces 10 malades fut bénigne et la cicatrisation se produisit lentement et sans fistule. On ne put établir de corrélation entre les quatre autres types de microbes et le tableau clinique des malades sur lesquels on les avait prélevés; de plus, les épreuves pour en déterminer la pathogénicité ne furent pas concluantes. Tous les types consistaient en bâtonnets sans embranchements, fortement résistants à l'acide et à l'alcool et produisant des colonies bien pigmentées, dont la couleur passait du jaune clair à l'orange foncé. Tous se développaient le mieux sur des milieux de culture servant à isoler le *M. tuberculosis*, quoique de bons résultats furent aussi obtenus sur un grand nombre d'autres milieux; onze des quatorze types utilisèrent la paraffine comme unique source de carbone. D'après les résultats de leurs travaux, les auteurs croient que les dix souches, provenant d'infections subaiguës de ganglions lymphatiques chez des enfants, appartiennent à un type particulier de Mycobacterium et doivent être considérées comme la cause réelle de l'adéno-lymphite. On a proposé de le nommer: *Mycobacterium scrofulaceum* (N.sp.). M.R.D.

TUBERCULOSIS: AN INCOMPLETE VICTORY*

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IN REVIEWING the annual reports of the Canadian Tuberculosis Association, some going back to its beginning in 1900, I was very much impressed with the many notable men who have guided and have been associated with the crusade against tuberculosis in Canada during the past half-century. Carlyle said, "The history of the world is but the biography of great men."

It can also be said that the history of the campaign against tuberculosis is the biography of many great men. It is difficult now for us to appreciate the vision, courage and determination of these pioneers. The task ahead was formidable, and the way obscure. In 1905 the President of the Canadian Tuberculosis Association stated, "The Association does not and cannot deal with the erection of sanatoria. Its work is to educate the people of Canada as to the desirability of doing certain things to prevent the spread of the plague which is causing such ravages in Canada." . . . "If this Association receives the encouragement to which it it entitled, and well deserves, it will be the means of doing one of the greatest works ever done

*Presidential Address given at the Annual Meeting of the Canadian Tuberculosis Association, Niagara Falls, Ont., May 1956.

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or that will be done in Canada. . . . The great object is to educate the people so they will urge the Government to deal with the problem in a way worthy of its importance and urgency." Education has been the spearhead of this Association's drive against tuberculosis for 50 years. Its importance today is as great as ever, if complete victory is to be accomplished.

The tuberculosis problem throughout the years demanded changes in emphasis of control measures but when principles enunciated as far back as 30 years are reviewed, it is striking just how applicable they are today. Dr. R. G. Ferguson in an address in 1925 dealt with the primary importance of public health agencies, medical colleges and preventive medicine. He emphasized the importance of the sanatorium as an education centre, family physicians in prevention and early diagnosis, travelling consultants and tuberculosis clinics, follow-up work, and education of the public. The cumulative effect of following these fundamentals and the more recent advances in treatment and knowledge of tuberculosis have accelerated accomplishment, but nevertheless in the state of our present knowledge eradication depends upon prevention and the following of the same principles proclaimed over 30 years ago.

I believe our greatest duty today as an Association lies in keeping people from an assumption that tuberculosis is rapidly on its way out and that it no longer creates a major public health problem. In view of the falling death rate, such an attitude is not surprising. Humanity spent so many centuries struggling against tuberculosis as the first cause of death that it is understandable that we cannot quickly shift to appraising it in any other terms. The measure of progress was the mortality rate, and not many years ago the number of deaths was the main factor in estimating the required complement of sanatorium beds. The satisfaction over reduced mortality has blinded many to the sustained tuberculosis morbidity, and its chain of causes and effects. Even from the point of view of deaths alone, we cannot ignore the fact that, despite the remarkable advances in treatment, there were over 1,300 deaths from tuberculosis in Canada last year. In 1955, in Canada 10,177 new cases of tuberculosis were diagnosed. The incidence of new cases during the last five years has not fallen at nearly the same rate as the death rate. Dr. G. J. Wherrett, Executive Secretary of the Canadian Tuberculosis Association, reports an 8% drop in new cases last year but points out that, even if this rate of decrease continued, 37,000 Canadians would contract tuberculosis in the next five years. There are today 15,000 Canadians in sanatoria, where they will remain on treatment for tuberculosis for over a year. These facts bear witness that this one disease is still of grave social, economic and public health significance. I do not wish to impart an attitude of pessimism but I must emphasize that in spite of the great strides that have been made our progress against tuberculosis is incomplete. To gain complete victory intense effort will have to be applied for many years to come.

Nevertheless, there has never been in the past more justification for optimism. Eradication may take less time than we thought even ten years ago. Treatment was never more effective, case-finding and diagnostic facilities were never so readily available or refined, the public was never more fully informed and government assistance at all levels was never greater. We must strive for newer and better methods to rout tuberculosis completely, and at the same time continue to use to the greatest possible advantage the weapons we are familiar with. Prevention of the spread of infection is still the foundation of tuberculosis control and the prompt finding of new cases the essence of success. This may sound elementary, but our experience and knowledge is always increasing, even concerning that basic measure—case finding. We now appreciate that these efforts need to be more concentrated and intensive among certain segments of our population, such as among older people, those admitted to general hospitals and those in the lower strata of our society. We also need to realize that with more people remaining alive who have had tuberculosis, supervision of the discharged patient has, if anything, gained in importance.

I wish to draw attention to the occurrence of small epidemics of tuberculosis, which, of course, are not new but seem to be appearing more frequently in Manitoba—indeed, last month that province was headlined across Canada because of an epidemic in a small community in Northern Manitoba. Previous surveys yielded nothing of undue significance. The initial case was in a child of 11 who had had symptoms for six months, finally hæmoptysis,

and on admission to sanatorium had widespread disease and positive sputum. A few days later another child from the same classroom was admitted with a pleural effusion. The whole population (679) was given x-ray examination. Twenty-five per cent of the school children had a positive tuberculin test. Twelve others—that is, 14 in all—were found to have varying degrees of acute primary disease demonstrable by radiograph, and all were admitted to sanatorium.

What can we learn from this experience? The first child, who no doubt was the source of infection for the other 13, had been in a general hospital six months previously with a respiratory illness. Her tuberculin test was positive. The child was discharged with radiographic evidence of abnormality and returned to school. Within one month a classmate was treated for erythema nodosum. Tuberculosis should have been suspected in the first case and, if the clue provided by the erythema nodosum had been followed, about five months' exposure of the other children to infection could have been avoided. General practitioners and general hospitals need to be on the alert for tuberculosis. The tuberculosis infection rate of our school children is low, averaging about 5%. They are particularly vulnerable to tuberculosis infection. Discovery of a case of open tuberculosis demands prompt and thorough investigation of all known contacts.

We speak of curtailing chest x-ray surveys and this may be justified in some areas, but it is of greater importance that the survey should have as close to 100% coverage as possible. This will not be attained by compulsion but by a much greater thoroughness in education, organization of surveys and a higher standard of public education. Advances in prevention have not kept up with those in treatment.

I have just touched upon case-finding and prevention but cannot leave this field without reference to vaccination with BCG. The latest available figures are for 1954, during which year there were 25,000 BCG vaccinations in Canada, not including Quebec, but including 16,000 in Newfoundland and 5,000 in Saskatchewan. There is no national vaccination program. Apart from Quebec and possibly Newfoundland, vaccination is being confined mainly to those who have a greater-than-average likelihood of exposure to tuberculosis infection. This restricted policy is logical unless a mass vaccination program can be followed through year by year with tuberculin testing and re-vaccination.

I will now refer to a perplexing question experienced to some degree in all provinces. What should be done about empty sanatorium beds? All realize that we still have plenty to do in the prevention and control of tuberculosis, but, as for treatment, we do have to look immediately to the future because of the increasing number of vacant beds. It is unlikely that there can be a solution on a national scale, as in most instances local needs and circumstances have a bearing on the problem. The Management Committee of this Association has recommended to the Executive Council that provision be made for a detailed national study to assess all anti-tuberculosis facilities, including sanatorium beds and their occupancy, with a view toward making recommendations provincially, and possibly formulating direction on a national scale. Certainly the Provincial Associations should be strengthening their organizations and broadening their interests, so that they will be more able to take care of any health problem that may fall within their scope.

It is more essential now that medical men in our field of work have high medical qualifications. To be specialists in tuberculosis, as well as to be prepared for wider fields of activities, even if confined to chest diseases, we need to be specialists in internal medicine. We need a deeper knowledge in the newer studies of pathology, physiology and biochemistry. In the beginning of our specialization there were certain factors that tended to drive us into the position of knowing "more and more about less and less". Sanatoria were built in remote places. Transportation was often poor or difficult. Opportunity for consultation was infrequent. We were poor and our patients were poor. Tuberculosis was so prevalent and came to us in such an advanced stage that differential diagnosis was hardly a necessity. A profound clinical and psychological knowledge of tuberculosis was developed, which certification in medicine alone cannot provide. Today the treatment of tuberculosis is more specialized than ever, with ramifications into many special fields of knowledge which demand higher training standards. This is of greater importance now if we expect to use our hospitals and medical personnel for the treatment of other diseases. The waning interest in undergraduate teaching of tuber-

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culosis is a matter of concern. There is a tendency to forget that even with our highly organized clinics and surveys the general practitioner is still in the front line in case-finding. A considerable proportion of those diagnosed as tuberculous for the first time consult their doctor because of symptoms, and so he often has the first opportunity to make the diagnosis. Besides diagnosis, the family physician will have in the future a greater responsibility, at least numerically, for patients at home who have had tuberculosis.

We seem satisfied about the early stage of tuberculosis when diagnosed, but have we reason to be? Comparing the degree of advancement of pulmonary tuberculosis for first admissions to sanatoria in Canada for the years 1950 and 1954 respectively, the percentages are as follows: minimal, 27.5 and 31.6; moderately advanced, 42.5 and 43.0; far advanced, 29.0 and 24.2. One-fourth of the new cases admitted to sanatoria have advanced disease and there has been little improvement in this respect during the last 5 to 10 years.

I have touched rather sketchily on a number of matters and omitted discussing other problems and aspects of our campaign against tuberculosis. I wish to place main emphasis on education and its importance as our continuing weapon. We can gain great encouragement and confidence for the future by the substantial gains that have been made, but we need to continually remind people how far we are from conquering tuberculosis. It is our job to see that prevention is carried out with the same thoroughness which has brought treatment and diagnosis to their present efficiency. In this the great work of the voluntary organizations across Canada continues to be indispensable. My final thought can best be expressed in the words of Dr. Wherrett: "We must face the fact that we have a lot of unfinished business and our campaign against tuberculosis is still an incomplete victory."

THE MANAGEMENT OF INJURIES TO THE LOWER URETER*

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MISADVENTURE in gynæcological surgery is the commonest cause of injury to the ureter. The injury is occasionally recognized at the time of surgery, but more often the urologist is called upon to treat the resulting complications. The latter include: (1) ureteral obstruction, (2) urinary extravasation, (3) ureteral fistula. This presentation will be limited to a discussion of postoperatively discovered ureteral injuries; in addition, four representative cases will be described.

The prophylactic treatment of ureteral injuries primarily revolves around the preoperative insertion of ureteral catheters. Urologists have repeatedly shown the efficacy of this easily executed safeguard against ureteral injury, but the gynæcologists rarely heed the plea. The insertion of large ureteral catheters preoperatively is simple and safe, should not be expensive to the patient, and should be used more often by the gynæcologist in major pelvic surgery. Ureteral catheterization will be found of considerable help in those cases where trouble may be expected because of a distortion of normal anatomical relationships.

Unilateral ureteral injuries will be discussed under two headings, namely, the treatment of the ligated ureter and the treatment of ureteral fistula. The treatment of urinary extravasation will be omitted from this presentation. It is rarely encountered as an isolated entity following ureteral injury. The principles of treatment involve incision and drainage of the extravasation plus the treatment of the cause.

Fig. 1 schematically shows the choices of therapy to be considered in the management of a unilaterally ligated ureter discovered hours or days after the primary operation. The aim of therapy is the re-establishment of ureteral continuity and the preservation of renal function. Consider first the uncomplicated or silently ligated ureter. Once the accident is discovered, two choices are available, either to treat the obstructed kidney or not to treat it. If no treatment is planned—and this course is the one most

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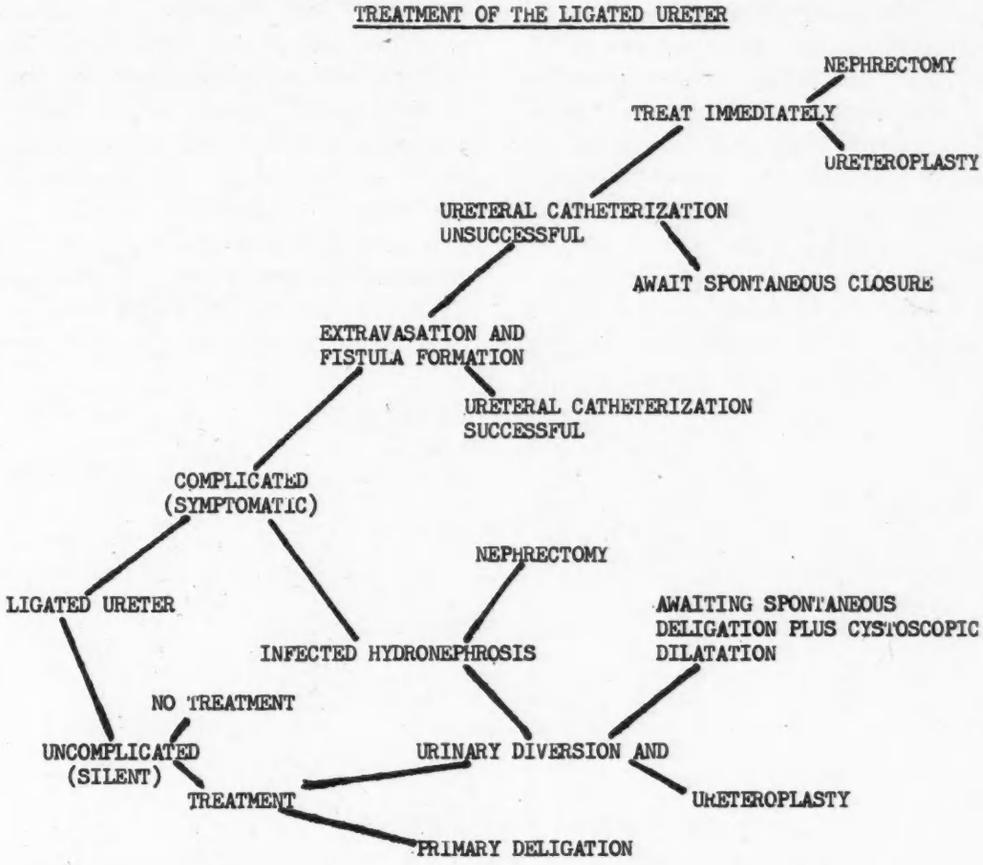

Fig. 1

often taken—one of the following five sequelæ will occur:

1. *Hydronephrotic atrophy.* In the majority of cases, silent, aseptic hydronephrotic atrophy follows after the ureter is completely ligated, resulting in a functionless kidney. In about 15% of these cases the silence is disturbed by the introduction of infection, with the result that recurring pyelonephritis or pyonephrosis develops, making surgical therapy mandatory.

2. *Necrosis and extravasation.* The extravasation may be either intraperitoneal or extraperitoneal. Isolated extraperitoneal extravasations are rare and usually are but a stage in the development of the third sequela, namely:

3. *Fistula.* The fistula may be either uretero-vaginal, uretero-cutaneous, or uretero-peritoneal, the uretero-vaginal being the most common.

4. *Secondary contracture* of the fistulous tract. As a result of this contracture a hydro-uretero-nephrosis may develop which will be followed by a silent atrophy of the kidney. The latter is the sequence of events in those cases resulting in so-called spontaneous healing of a uretero-vaginal fistula. Should infection become established, recurring pyelonephritis or pyonephrosis will follow.

5. *Azotæmia.* This develops when the other kidney is deficient in function or absent.

In order to prevent these sequelæ and to preserve renal function it is suggested that the silently ligated ureter be treated, if the accident is discovered within three weeks of its occurrence. The three-week period is more or less arbitrarily chosen as the longest period in which one can expect a return of kidney function after complete ureteral obstruction is relieved. A return of function following longer periods of obstruction has been reported, but the three-week period is the one used by most writers on this subject. If treatment is planned, two choices of therapy are available, namely, *deligation or urinary diversion.* With unilateral ligation, primary deligation should be the procedure of choice for these uncomplicated cases. The viability of the ligated segment determines what must be done in addition to the deligation. If ureteral viability has not been compromised, the ligature is removed and a splinting ureteral catheter is introduced either cystoscopically or through an incision in

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the ureter, the catheter subsequently being delivered from the bladder with the aid of the cystoscope at the conclusion of the operation. Of the two methods for splinting the ureter, the former is preferred. The catheter should be left inlying for five to seven days. If the ligated segment is not viable or questionably so, the ureter should be either re-implanted into the bladder or the non-viable segment resected and the ureteral segments anastomosed end to end. Re-implantation into the bladder is to be preferred to resection with end-to-end anastomosis and in both procedures a splinting catheter should be used. If urinary diversion is the chosen procedure, one can subsequently wait for spontaneous deligation, and in addition periodically attempt to dilate the ureter cystoscopically while the ligature is softening. Spontaneous deligation of a tied ureter would appear to be more a theoretical possibility than real, and in most of these cases ureteroplasty will eventually have to be done.

There remains for consideration the ligated ureter complicated by the development of symptoms due in large measure to infection. The treatment of fistula formation will presently be discussed. The management of the infected hydronephrosis poses a much more difficult problem. Either a nephrectomy can be done or the urine can be diverted temporarily and a ureteroplasty subsequently carried out. Likely, in the majority of cases, nephrectomy would be recommended, but with antibiotic control it is often surprising what can be accomplished by conservative measures.

In Fig. 2, the treatment of ureteral fistula is schematically presented. Once the diagnosis of a uretero-vaginal fistula has been established, the plan of therapy is pretty well stereotyped.

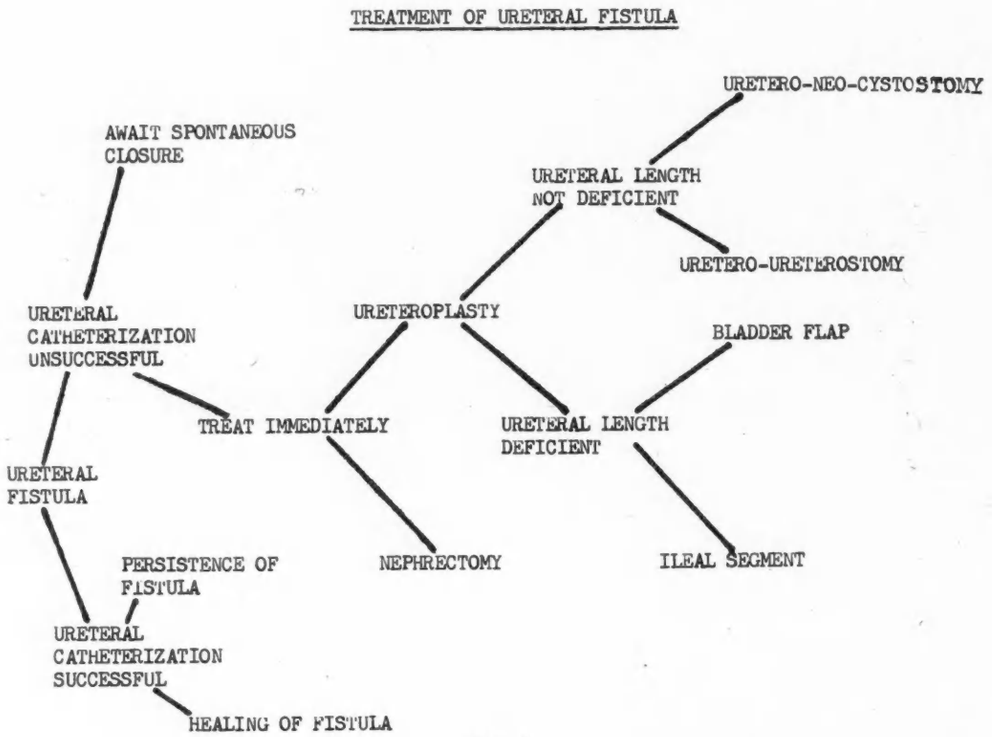

Fig. 2

An attempt should be made to by-pass the site of the ureteral fistula with a ureteral catheter introduced cystoscopically, and if this is successful, the catheter should be left inlying for seven to ten days if possible. After removal of the catheter, one can anticipate healing of the fistula with preservation of renal function. Such were the circumstances in the first case to be presented.

CASE 1

A 40-year-old white woman underwent a total abdominal hysterectomy and bilateral salpingo-oophorectomy in July 1955. Her postoperative course while in hospital was uneventful, but 15 days after operation she noticed the escape of urine per vaginam. A diagnosis of left uretero-vaginal fistula was made by analyzing the results of the indigo-carmine bladder test and the intravenous pyelogram. The latter showed delayed excretion of the dye on the left side as well as hydro-ureter

and hydronephrosis (Fig. 3). At cystoscopy it was possible to pass two ureteral catheters up the left ureter to the kidney pelvis and these catheters were left inlying. The ureteral catheters extruded themselves spontaneously after the fifth day, following which vaginal leakage reappeared, having disappeared while the catheters were in place. Repeat cystoscopy was performed but attempts at catheterizing the left ureter at this time proved unsuccessful. The following day the vaginal leakage was minimal. The ninth day after insertion of the ureteral catheters an intravenous pyelogram showed good function of both kidneys but there was slight dilatation of the left kidney. She had no vaginal leakage of urine at that time and has remained dry ever since.

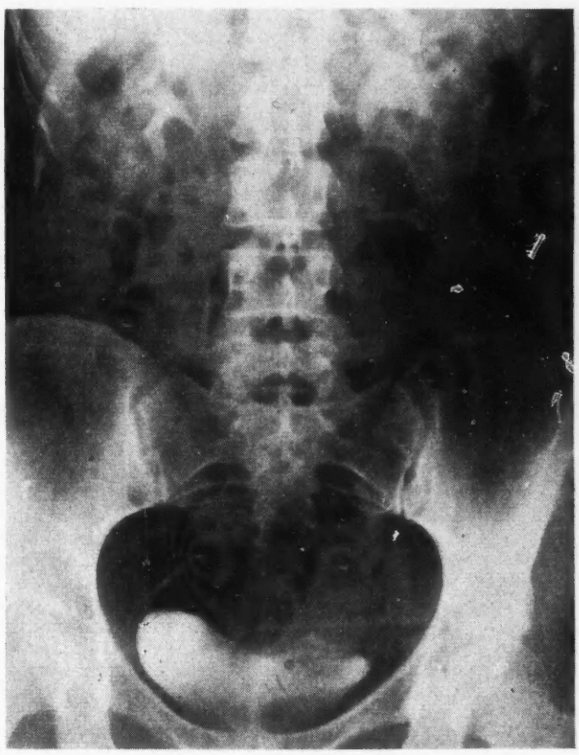

Fig. 3

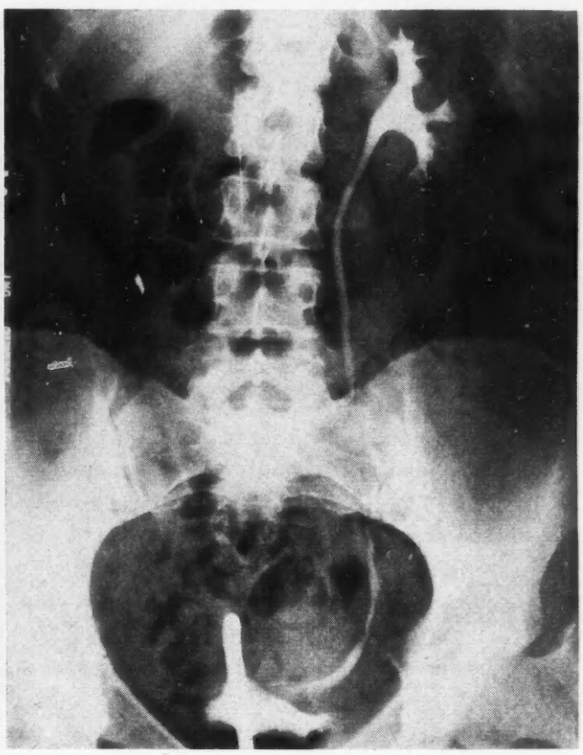

Fig. 4

Fig. 3. (Case 1).—Intravenous pyelogram showing dilated left kidney, pelvis and ureter, in patient with left uretero-vaginal fistula. **Fig. 4.** (Case 1).—Retrograde pyelogram showing normal left kidney and ureter. Uretero-vaginal fistula cured by inlying ureteral catheter.

Three weeks later a repeat intravenous pyelogram showed good function of the left kidney, and no dilatation of the kidney or ureter was noted. Three months later a cystoscopy was performed and a catheter was passed with ease up the ureter to the left kidney. The urine from the kidney was free from infection, and indigocarmine appeared promptly and in good concentration. The pyelo-ureterogram was normal (Fig. 4).

In summary, in this case a uretero-vaginal fistula was cured by the insertion of ureteral catheters cystoscopically.

If a ureteral catheter cannot be passed cystoscopically beyond the site of the fistula, a difference of opinion exists as to what should be done next. The answer is vital because it involves the function of the kidney. There are many, both gynæcologists and urologists, who suggest in their writing that when a catheter cannot by-pass the fistula, a waiting policy should be adopted in the hope that the fistula will close spontaneously. This decision is in marked contrast to the one to be advocated in this paper, namely, that the condition should be surgically treated without delay. Benson and Hinman state: "The surgeon should not be forced by the patient to intercede too soon in the repair of uretero-vaginal fistulæ, because many of these fistulæ heal spontaneously."[1]

Howkins reports: "It is best to postpone a surgical correction of a uretero-vaginal fistula for as long as possible and six months is again a wise interval to wait. Some of these fistulæ heal spontaneously if left alone, and while awaiting this happy event the surgeon can make his patient reasonably comfortable. . . ."[2] Many such references can be found in the literature dealing with the expectant treatment of uretero-vaginal fistulæ, but they are all vague as to the ultimate outcome, using such words as occasionally, sometimes, or not infrequently. Few authors state with any degree of statistical accuracy just how many of these fistulæ do close, and more important, how many close with preservation of renal function. The recent report by Liu

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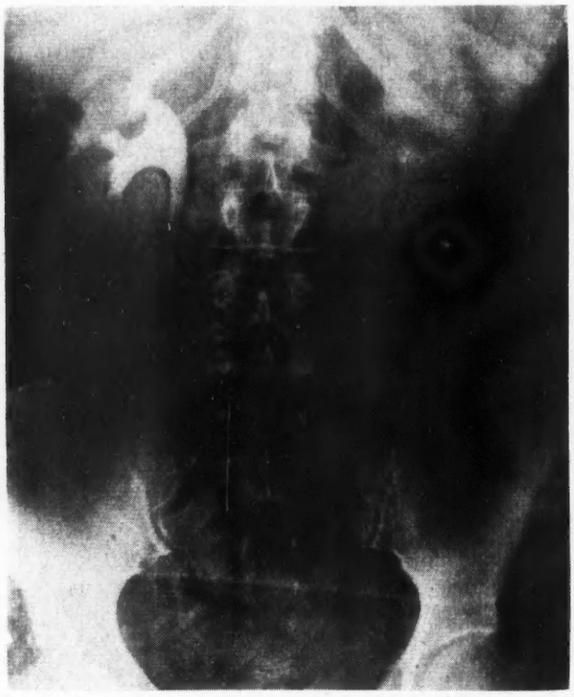

Fig. 5. (Case 2).—Intravenous pyelogram showing delayed function with hydronephrosis on the left side.

and Meigs provides some facts and figures relative to this question.[3] In analyzing the results in 478 patients who had a radical hysterectomy and pelvic lymphadenectomy, they found 28 cases of unilateral uretero-vaginal fistulæ. Of this number, 13 were found to heal spontaneously one to ten months after the operation, and the other 15 showed no signs of healing after a satisfactory period of observation. In other words, about 50% of these uretero-vaginal fistulæ healed spontaneously, but on further analysis it was shown that this healing was usually associated with a disturbance in kidney function. In 11 of the 13 cases with spontaneous healing, the kidney function was evaluated, and in only one case was there no impairment of renal function. In five cases a non-functioning, symptomless kidney was found and in the remaining five a ureteral stricture had developed which was treated by repeated dilatations, reimplantation into the bladder, or nephrectomy.

The next two case reports are pertinent to the problem. In the first case operation was performed as soon as it was demonstrated that the site of the ureteral obstruction could not be by-passed with a ureteral catheter, and a cure was obtained by uretero-neo-cystostomy. In the other case, expectant treatment was pursued, and eventually infection developed necessitating nephrectomy.

CASE 2

Mrs. R.G., a 49-year-old white woman, had a total abdominal hysterectomy in June 1955, for carcinoma *in situ* of the cervix. About five weeks after the hysterectomy she began noticing leakage of urine per vaginam, and on vaginal examination urine was noted in the vaginal vault. Urological investigation established the diagnosis of a left uretero-vaginal fistula. The intravenous pyelogram showed delayed function with hydronephrosis on the left side (Fig. 5). Attempts at catheterizing the left ureter proved unsuccessful, an obstruction being met 2 cm. up the left ureter. A left uretero-neo-cystostomy was done without further delay and her postoperative course was uneventful. An intravenous pyelogram taken one month after operation showed a normally functioning left kidney (Fig. 6). The patient was last seen three months after the ureteroplasty and was free from symptoms. No reflux of dye was demonstrated on the plain or voiding cystogram. At cystoscopy a catheter passed with ease to the left renal pelvis, and indigo-carmine appeared from this kidney in three minutes with excellent concentration. The retrograde pyelogram was normal (Fig. 7), and the urine culture from the bladder and left kidney grew nothing.

This cure by ureteroplasty is in contrast to the failure resulting from expectant treatment, as is exemplified by the next case.

CASE 3

R.G., a 55-year-old white woman, was admitted to the New Mount Sinai Hospital in April 1955, for repair of cystocele and retrocele. This was done and in addition the cervical stump, left behind from a subtotal hysterectomy ten years before, was removed. Fifteen days later she began having urinary incontinence which necessitated her readmission to hospital, at which time a diagnosis of right uretero-vaginal fistula was made. Two unsuccessful attempts were made at catheterizing the right ureter, an obstruction being met 2 cm. up the ureter. Following the second attempt, however, the patient noted that there was a decrease in the amount of vaginal leakage. Further therapy was guided by a statement found in Rolnick's *Textbook of Urology*, in which he states: "It is surprising to note the number of patients with uretero-vaginal fistula who can be cured by repeated ureteral dilatation. Repeated attempts to dilate the ureter may be unsuccessful at first until finally a catheter or bougie is passed and from then on further dilatation easily cures the patient."[4] It was decided to give this plan of repeated attempts at dilatation a trial, and the patient was consequently discharged from hospital to await the next attempt at catheterizing the ureter. While at home, the urinary leakage per vaginam remained minimal and showed signs of slowly decreasing to the point that it was almost nonexistent. One month after the last attempt at ureteral dilatation she developed chills and fever, pyuria, and tenderness in the right kidney. The right pyelonephritis was satisfactorily controlled by terramycin, and an intravenous pyelogram at this time showed no function of the right kidney in three hours. The patient was readmitted and another attempt at catheterizing the right ureter proved unsuccessful. A right nephrectomy was subsequently done. At operation, the kidney pelvis and ureter were tense and after the ureter was severed pus escaped which cultured paracolon bacteria. The pathologist found thick pus in the pelvis of the kidney, and on microscopic examination there was widespread interstitial infiltration with inflammatory cells. The final pathological diagnosis was chronic pyelonephritis with hydronephrosis.

The results following uretero-neo-cystostomy and uretero-ureterostomy are generally considered to be good. When there is no deficiency

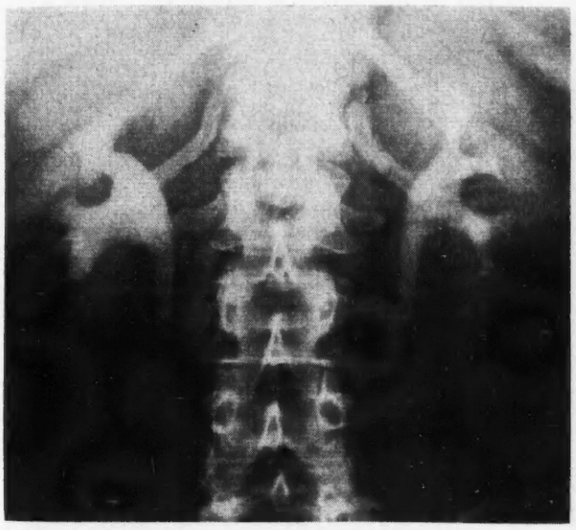

Fig. 6. (Case 2).—Normal intravenous pyelogram obtained postoperatively after uretero-neo-cystostomy for left uretero-vaginal fistula.

in ureteral length, they are the methods of choice. Of the two, uretero-neo-cystostomy would seem to be preferred because of less risk of subsequent stricture formation. When there is a deficiency in ureteral length, a bladder flap may be constructed to bridge the gap. Rarely is this procedure done if the proximal ureter does not extend down to the pelvic brim. Under such circumstances, and in addition when the bladder is so contracted that a flap of sufficient length cannot be constructed, the gap can be bridged by an ileal segment as was reported to this section by Baum two years ago.[5] The bladder flap and ileal segment, to bridge a ureteral gap, has its greatest field of usefulness in the sloughed or strictured ureter encountered after radical hysterectomy for carcinoma of the cervix.

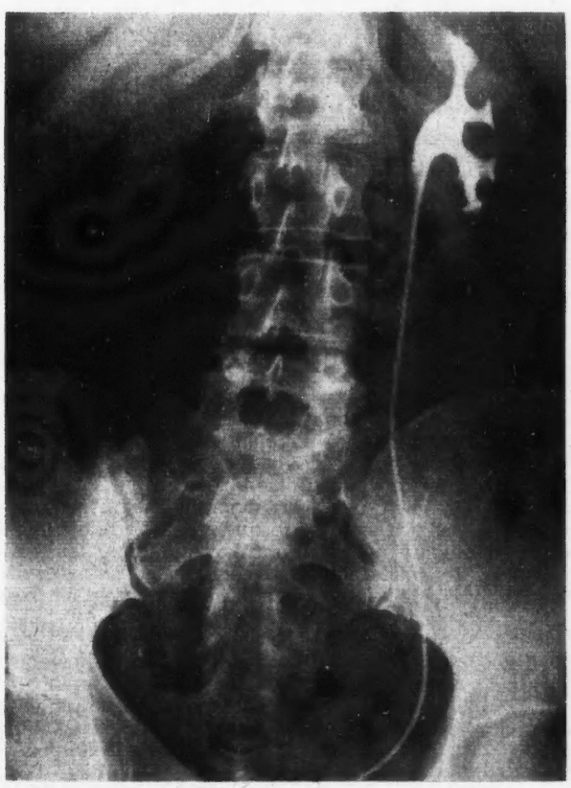

Fig. 7. (Case 2).—Retrograde pyelogram in patient with left uretero-neo-cystostomy.

With bilateral injuries the trouble is double, but, more important, it is the patient's life and not unilateral kidney function that is in jeopardy. Unless operation is performed immediately, uræmia and/or sepsis will ensue and ultimately prove fatal in days or a few weeks at most. Many of the principles previously discussed are applicable here and need not be mentioned again. While bilateral extravasation or bilateral ureteral fistula may require consideration in treatment, of prime interest in this category is bilateral ligation of ureters.

The following case report will serve to introduce the subject.

CASE 4

A 46-year-old white woman was admitted to hospital in July 1955 with the diagnosis of myomata of the uterus, for which a total hysterectomy and bilateral salpingo-oophorectomy was done. Scarring, adhesions and a cervical fibroid made the operation difficult, and 12 hours after its completion I was asked to see the patient because no urine had been passed since operation. She had received blood transfusions during and after the operation but had not been hypotensive during this interval. Cystoscopy performed 12 hours after operation revealed marked ecchymosis of the bladder floor as well as a large extravesical mass distorting the trigone and floor of the bladder. The ureteral orifices could not be visualized because of this distortion, and after a diligent search had been made, the procedure was terminated. A provisional diagnosis of bilateral ligation of ureters was made, but it was decided to postpone surgical therapy until it was determined with certainty that the ureters were blocked and at what level the obstruction existed. It was felt that visualization of the ureteral orifices would have to await the shrinkage of the distorting mass, and in fact the orifices did not become visible until 48 hours after the operation, at which time bilateral obstruction of the ureters was found 2 cm. from the ureterovesical junction.

During the 48 hours in which both ureters were completely obstructed the patient's only complaint was nausea and vomiting. By the second day there was slight periorbital swelling but the lungs were clear and there was no peripheral œdema. The non-protein nitrogen level rose from 39 mg. % on the first day to 47 mg. % on the second; as regards blood electrolyte levels after 48 hours of complete post-renal obstruction, there was a carbon dioxide combining power lowered to 43 volumes %, normal serum sodium and serum chloride levels, and an elevated potassium level to 7.6 mEq./l.

After cystoscopy had revealed bilaterally obstructed ureters, the diagnosis was established and the patient operated upon immediately.

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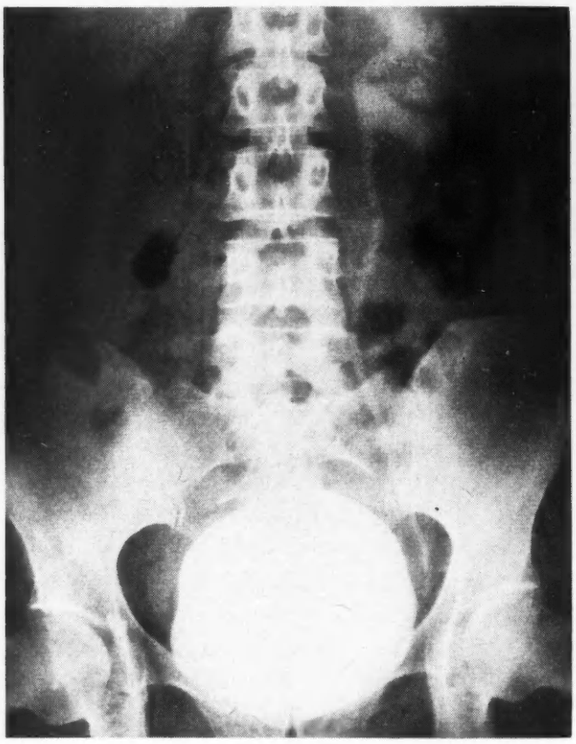

Fig. 8

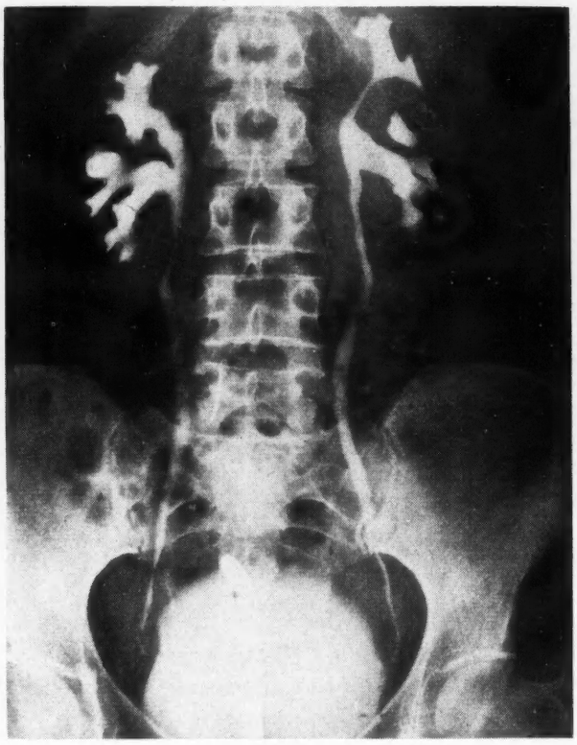

Fig. 9

Fig. 8. (Case 4).—Cystogram showing reflux up the left ureter after uretero-neo-cystostomy.
Fig. 9. (Case 4).—Bilateral pyelo-ureterogram after bilateral uretero-neo-cystotomy.

Before continuing the case report, a digression will be necessary to consider the differences of opinion that exist concerning the management of the bilaterally ligated ureter. Two schools of thought have developed, namely, that of Caulk,[6] advocating bilateral nephrostomies with subsequent ureteroplasty if spontaneous deligation does not occur, and that of Herman,[7] preferring primary deligation with cystoscopic control. Through the years both schools have had their followers, but from a review of the literature, I had the impression that bilateral nephrostomy as advocated by Caulk was most popular. As one reads the isolated case reports of bilateral ligations the impression is gained that primary deligation is associated with a much higher mortality rate. If bilateral nephrostomy is done in such cases, multiple operations and a long hospital stay are necessary but there is reasonably good assurance that the patient will remain alive with normally functioning kidneys. The chief objection to primary deligation is that the operation is difficult because of the distortion and thickening of the tissues at the site of the recent operation. This, coupled with the fact that the patient is not in the best condition to withstand prolonged surgery, would make it appear that primary deligation is extremely hazardous in most circumstances. I think that the procedure might have a place only in a patient in good general condition with the obstruction 5 or 6 cm. from the uretero-vesical junction. With the obstruction at this level, cystoscopic ureteral control could be counted upon to be of some assistance in locating the ligature. With obstructions closer to the bladder, delineation of the structures would be very difficult, and I wonder how much help the ureteral catheters would be.

To return to the case study. A bilateral nephrostomy was selected as the procedure of choice. At operation both kidney pelves were found distended and tense, establishing the diagnosis of obstruction as the cause of the postoperative anuria. Nineteen days after the urinary diversion was performed the patient was discharged, but she was readmitted one week later because one of the nephrostomy tubes had come out. This was replaced with ease. Originally a longer period of nephrostomy drainage was planned, but because the patient's home conditions precluded satisfactory care, definitive surgery was decided upon at this time. The patient's general condition had deteriorated in the week she had been at home. Her hæmoglobin level was down to 59%. The N.P.N. was 23 mg. %. She was transfused with blood and given supportive therapy for one week before operation. A bilateral uretero-neo-cystostomy was performed about one month after the nephrostomies, and I was impressed with the freedom from inflammatory reaction in the pelvis. Structures were identified readily and dissection was accomplished without difficulty.

Recovery after ureteroplasty was slow. She was ultimately discharged to a convalescent hospital 41 days

after the operation. At the time of discharge the patient was voiding satisfactorily and was free from pain. She was last seen in January 1956 and looked extremely well. A few weeks previously, she had had left costo-vertebral angle pain for two days unassociated with fever. A cystogram showed reflux up the left ureter (Fig. 8). Catheters were passed up both ureters with ease and indigo-carmine appeared promptly but the concentration was reduced to about 50% from each kidney. The urine culture from the bladder and both kidneys showed no growth. Pyelo-ureterograms revealed minimal caliectasis (Fig. 9).

To summarize this case: A patient with bilaterally ligated ureters was cured by urinary diversion with nephrostomies and subsequent bilateral uretero-neocystostomy.

SUMMARY

Obstruction and fistula formation are the most common complications resulting from ureteral injury. The management of each of these entities is discussed, and four representative cases are presented.

Uretero-vaginal fistula may close spontaneously, but it often does so with the termination of renal function on the side of the lesion. It is suggested that a uretero-vaginal fistula be actively treated as soon as the diagnosis is established, so that urinary continuity can be re-established and renal function preserved.

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ADDENDUM

Since this paper was submitted for publication, a fifth case of low ureteral injury was treated. The patient, a 47-year-old white female, was readmitted to the New Mount Sinai Hospital on September 14, 1956, two weeks after a vaginal hysterectomy with cystocele and rectocele repair. The day before her readmission she noticed the involuntary escape of urine per vaginam. The cause was found to be due to a right uretero-vaginal fistula. A catheter could not be inserted up the ureter, so that surgical therapy was mandatory. A right uretero-neocystostomy was done. At the time of discharge from hospital, the vaginal leakage of urine was no longer present and the patient was voiding normally. An intravenous pyelogram done just before her discharge showed that the right kidney function was considerably improved. Hydronephrosis was still present but it was felt that this would improve with the passage of time.

RÉSUMÉ

L'insertion préopératoire de cathétères urétéraux, si on la pratiquait plus régulièrement, préviendrait nombre de complications urologiques attenantes à la chirurgie gynécologique. La ligature accidentelle d'un uretère peut causer l'une ou l'autre des lésions suivantes: une hydronéphrose accompagnée d'atrophie rénale, une nécrose avec extravasation d'urine intrapéritonéale ou extrapéritonéale, une fistulisation vers le vagin, la peau ou la cavité péritonéale, des rétrécissements résultant de la cicatrisation spontanée d'une de ces fistules, ou enfin, de l'azotémie. La correction de cette erreur de technique doit être accomplie le plus tôt possible (des les premières trois semaines, de préférence). Les alternatives offertes à l'urologiste sont: le dénouement de la ligature, la dilatation de l'uretère en attendant le dénouement spontané, ou la chirurgie réparatrice. Si l'infection s'est ajoutée à l'hydronéphrose, la néphrectomie peut devenir inévitable. L'auteur opte pour l'intervention dans les cas de fistulisation même avec cicatrisation car la fonction rénale peut souvent s'altérer par la suite. Il préconise l'urétéro-cysto-néostomie, le cas échéant. Dans les enserrements opératoires bilatéraux, l'intervention de correction revêt le caractère d'une urgence essentielle dont le premier temps est une néphrostomie bilatérale suivie plus tard de la libération des uretères. Il cite quatre cas extraits de ses dossiers comme illustrations des éventualités qui peuvent se présenter.

M.R.D.

INTRAPULMONARY GAS MIXING IN PULMONARY TUBERCULOSIS

A study has been made by Blair and Hickam (*Am. Rev. Tuberc.*, 73: 343, 1956) of intrapulmonary gas mixing in 21 patients with moderately advanced and far advanced pulmonary tuberculosis, using a method for estimating volume and ventilation rate of the most slowly ventilated portion of the lung.

The results show much variability but an over-all tendency toward abnormally unequal mixing, relatively large portions of the lungs having a very slow ventilation rate.

The finding that substantial portions of the lung may be very poorly ventilated in patients with advanced pulmonary tuberculosis is not surprising. Unequal expansion of the lung, with underventilation of some portions, might easily result from both parenchymatous and endobronchial disease. In particular, pulmonary emphysema of moderate degree often occurs in advanced tuberculosis, and other work has shown that intrapulmonary gas mixing is markedly impaired in patients with obstructive emphysema.

In many of the present patients, abnormal "slow spaces" were not encountered, and occasionally "washout" was unusually rapid. This result might be expected from simple loss of lung volume and maintenance of the normal total ventilation rate, with consequent hyperventilation of the remaining lung.

The ability of advanced tuberculosis to cause both unequal ventilation by altering the lung and relative hyperventilation by destroying some lung altogether probably accounts for the great variability in size and turnover rate of "slow spaces". The most common result of these opposing effects is to develop large, poorly ventilated lung spaces. The effect of adding surgical and collapse procedures to this complex situation is not easily predictable in our present state of knowledge.

THE SURGICAL TREATMENT OF CHRONIC CONSTRICTIVE PERICARDITIS*

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THE HISTORY of the operation pericardectomy is characterized by an increasingly radical approach to the problem. In an attempt to eliminate poor results and recurrences, surgeons have excised wider areas of the affected pericardium and they have used more adequate incisions. The early approach was through a left anterior incision, but soon these were extended to include resection of costal cartilages and extension into the sternum. Emile Holman[1] has done much to draw our attention to the necessity of a radical operation. As one studies reports in the literature, there does seem to be some correlation between better results and a more thorough excision of the pericardium.

This is a preliminary report of a series of 13 cases that underwent a radical excision of the constricting pericardium, or a subtotal pericardectomy. In the literature, one sees reports of postoperative cardiac failure, poor results, and sometimes late recurrences after surgery. These are sometimes blamed on what is described as myocardial atrophy and fibrosis. The authors would like to know what part the myocardium plays, or whether these unfortunate results may in most instances be due to inadequate removal of the pericardium. At least three writers have re-operated upon patients and performed a wider excision of the pericardium with further improvement.

The case-history files of the Toronto General Hospital are typical of the early reports of surgery performed when this operation was new. In four out of 10 pericardectomy operations performed by three surgeons at the Toronto General Hospital between 1939 and 1950, the patient died immediately after operation, presumably of cardiac failure. There were two recurrences, one year and 13 years after operation, each of which resulted in death. Four patients are alive and well.

It is not fair to compare an early and a late series of operations, for one must consider improved methods of anæsthesia, supportive therapy, and antibiotic therapy. However, recent reports of operations with wider excision of the pericardium have shown a reduction in the percentage of failures. It remains to be seen whether an even more radical approach will further reduce or eliminate failures, and what part myocardial atrophy plays in the problem.

INDICATIONS FOR OPERATION

By the time a case has been diagnosed as constrictive pericarditis, the patient has usually reached the stage of œdema, increased venous pressure, and probably ascites. It is felt that all such patients should be operated upon. However, the physician will occasionally be faced with the problem of a patient who has been found on routine x-ray examination of the chest to have calcification of the pericardium and some evidence of constrictive pericarditis without symptoms. Such a patient should be investigated by assessment of venous pressure and by cardiac catheterization. This latter procedure may demonstrate whether the constricted pericardium is affecting the efficiency of heart action. This is diagnosed by evidence of an increased end diastolic pressure in the right ventricle (see special studies).

Fig. 1 shows a series of chest x-rays over a period of three and a half years in a patient with no significant symptoms. This illustrates the rapidity with which the process may spread to involve the pericardium. In this particular case, results of cardiac catheterization and venous pressures indicated surgery. Fig. 2 illustrates a more advanced stage of the disease in another patient. Marked calcification is not a necessary finding.

TECHNIQUE

All patients are prepared with digitalis and maintained on this for several months after the operation. We have found that this prevents dilatation of the heart, which may occur after removal of the pericardium.

We feel that none of the unilateral incisions, even though they involve removal of costal carti-

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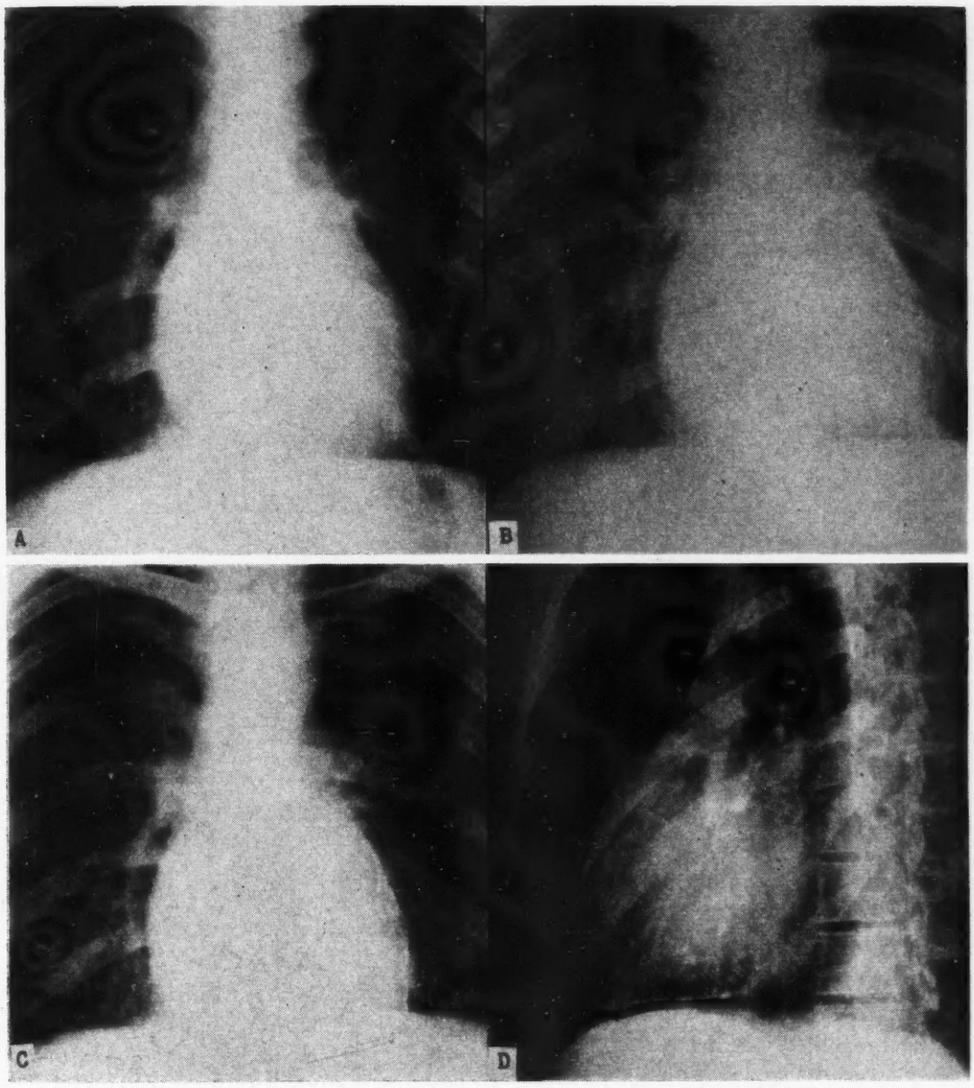

Fig. 1.—These radiographs of the same patient show the rate at which calcification may occur in the pericardium. (A) 3½ years before operation; (B) 2½ years before operation; (C) and (D) at time of surgery.

lages, will permit the surgeon to carry out a safe radical excision of the pericardium. The venæ cavæ and region of the atrio-ventricular groove are not readily accessible without manual retraction and compression of the heart which it tolerates poorly. To manage accidental tears of the heart wall properly may require better exposure than unilateral incisions will give. A sternal splitting incision has been advocated by some, but it is our feeling that a transternal incision, with both sides of the chest open, allows a subtotal pericardectomy with the greatest safety.

All the pericardium lying over the ventricles is removed, including the apex and diaphragmatic surface. The phrenic nerves are dissected free and the pericardium is removed posterior to that level. Removal of pericardium over the right atrium is not overly important and is carried out only if it can be done easily.

There is general disagreement as to whether it is important to free the venæ cavæ. In all cases reported in the authors' series, both venæ cavæ as well as both lung roots were dissected free.

The incision used is shown in Fig. 3. In females, it amounts to a bilateral submammary incision which extends from the midaxillary line on each side. The intercostal space entered depends on the position of the heart but usually it is the fourth space on the right side or the fifth space on the left. Fig. 4 illustrates the type of exposure obtained.

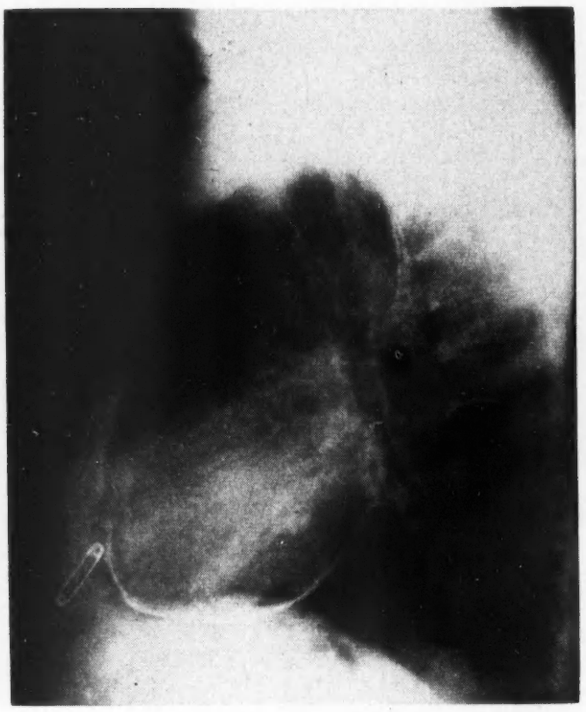

Fig. 2.—A lateral view radiograph to illustrate a more advanced stage of constrictive pericarditis in another patient. The heart is constricted into a globular mass by the thick calcified pericardium. It shows very little movement on fluoroscopy.

Four of the 13 cases were operated upon under hypothermia at a body temperature of 30° to 31° C. They were considered very poor operative risks. With proper control of blood pH and a body temperature not lower than 30° C., this is a reasonably safe procedure. We believe that this reduces the mortality rate in very poor risk cardiac surgery.[2]

ASSESSMENT OF CASES

Table I gives a summary of the assessment of the 13 cases presented for study. The average age was 29 years, with a variation from 16 to 56 years of age. The venous pressure in all patients was elevated with an average pressure of 24 mm. of saline.

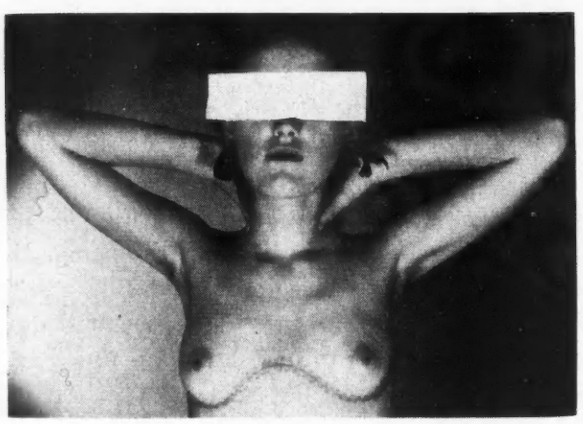

Fig. 3.—The transternal incision in a female patient. Usually the 4th interspace on the right and the 5th interspace on the left side are entered.

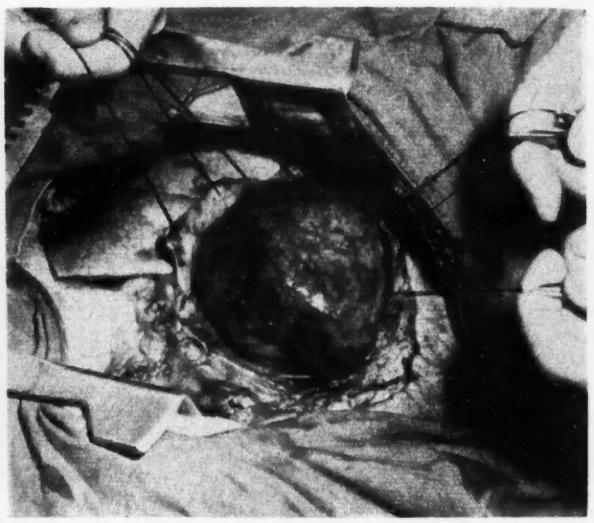

Fig. 4.—A view of the operative field with a transternal incision. At the completion of the operation, the pericardium will have been resected as completely as possible including the freeing of the venæ cavæ, lung roots, diaphragmatic surface, and the area posterior to the phrenic nerve. This provides excellent exposure and good control of any accidental injury to the myocardium.

The disability varied in these patients, but many of them were very advanced, debilitated, with massive pleural effusion and ascites. One patient had been completely bedridden for one and a half years with bilateral effusion and ascites with cyanosis and cachexia. Two patients had experienced recent active tuberculous processes and were in chronic failure with progressive deterioration. These two were operated upon urgently and with success. Active antituberculosis therapy was instituted before and immediately after operation and they were transferred to the sanatorium a few weeks postoperatively.

TABLE I.

CHRONIC CONSTRICTIVE PERICARDITIS

Number of cases	13
Average age	29
Signs of right heart failure	12
Average duration of signs	8½ months
Average venous pressure	24 mm. saline

TABLE II.

SUBTOTAL PERICARDECTOMY

Total cases	*Deaths*		*Recurrences 1-3 years*	*Mortality rate*
	Operative	*Post-operative*		
13	1	1	0	15%

Table II indicates the results of subtotal pericardectomy on this group of 13 patients. The operative death was due to pre-existing, unrecognized, coronary disease. The postoperative death was due to hepatic insufficiency in a patient in the terminal stage of his disease with advanced pulmonary fibrosis and cardiac cirrhosis. He had an excellent postoperative course for three days, and then developed hepatic coma and died in acute hepatic insufficiency.

Of the 11 survivors, one was operated upon too recently for proper assessment. The remaining 10 represent a follow-up of from 14 months to three years with an average of two years. Table III indicates the results. Fig. 5A demonstrates the preoperative œdema and jugular distension which has been corrected (Fig. 5B) following operation.

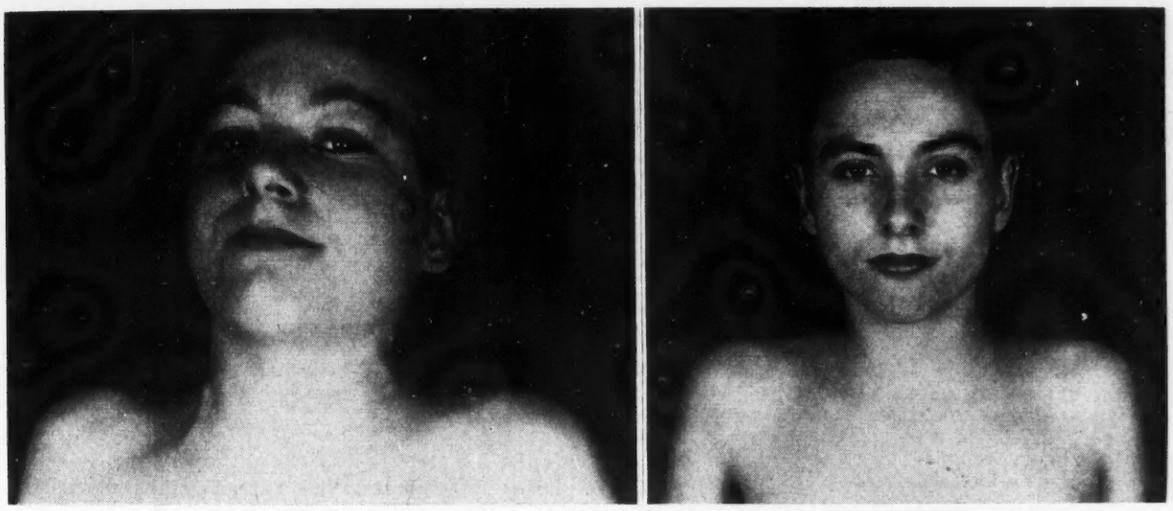

Fig. 5.—(A) Photograph taken before subtotal pericardectomy. Note the jugular vein distension and general puffiness of the face before operation. All patients operated upon in this series experienced a fall in venous pressure to normal range. (B) Photograph taken after subtotal pericardectomy.

SPECIAL STUDIES

In order to assess the value of an operation designed to excise most of the pericardium, special hæmodynamic studies are in progress preoperatively and at intervals after operation.

TABLE III.

RESULTS—SUBTOTAL PERICARDECTOMY

Follow-up 14 months to 3 years	
Excellent	7
Very good	2
Fair	1 (improving)
Total	10

Fig. 6 illustrates the venous pressure, circulation time, total blood volume, and cardiac output studied preoperatively, 4 to 6 weeks postoperatively, and approximately one year postoperatively on 4 patients. There is an improvement in all four values after operation. The interesting thing is that they all appear to continue this improvement during the ensuing year, which would suggest better myocardial function.

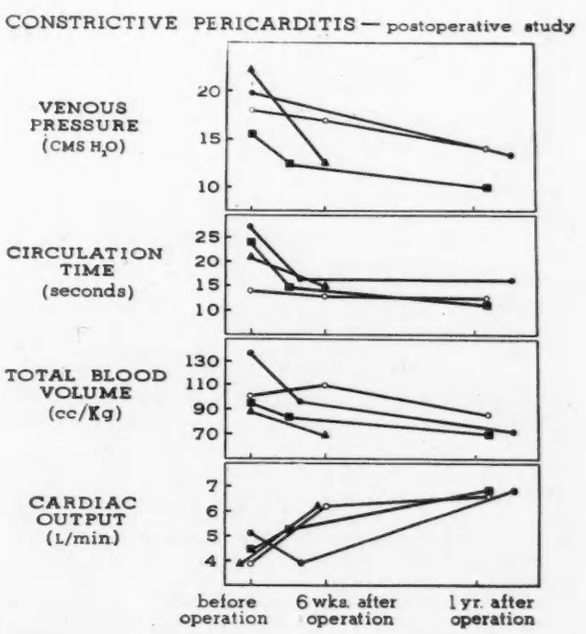

Fig. 6.—A graphic illustration of special studies in progress before and after pericardectomy. It is interesting that in the three patients studied one year after operation there has been evidence of continued improvement in cardiac function.

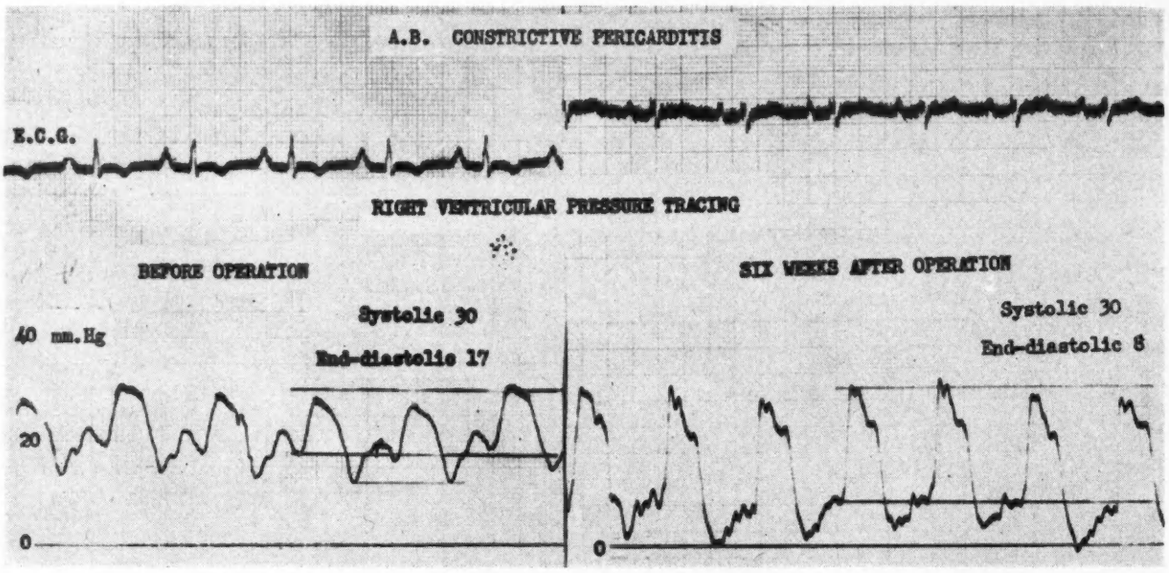

Fig. 7.—Typical right ventricular pressure tracings before and after operation. Preoperatively the "end diastolic pressure" was 57% of the systolic pressure. After operation this ratio was well under the normal maximum of 30%.

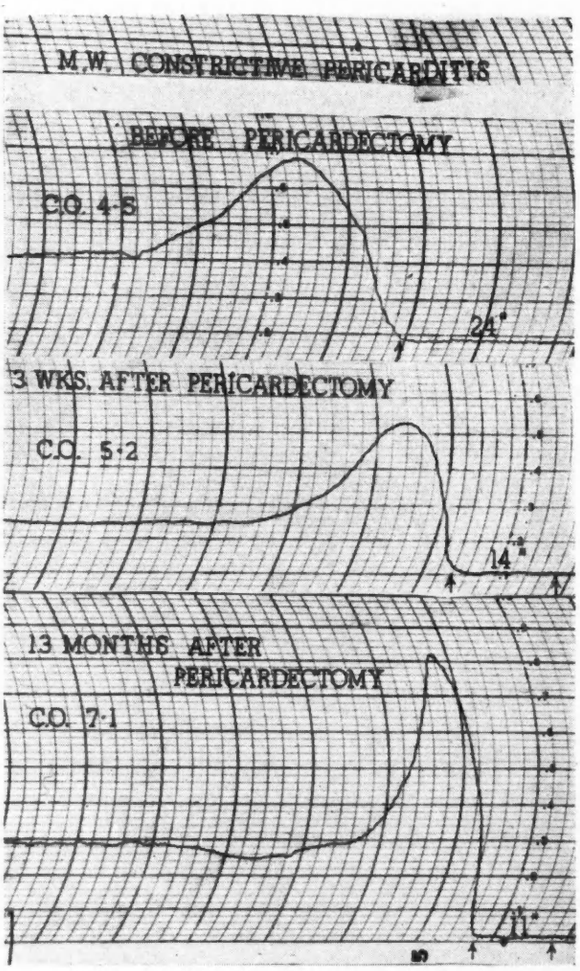

Fig. 8.—Illustration of the curve obtained using the Hamilton dye dilution principle. This illustrates the return to normal over a period of 13 months of the cardiac output, circulation time, and shape of the curve.

Fig. 7 indicates the typical right ventricular pressure tracing seen on cardiac catheterization before and after operation. Normally the end diastolic pressure should not be more than 30% of the systolic pressure. In the preoperative reading, the end diastolic pressure was 50% of the systolic pressure; this is considered typical of constrictive pericarditis. In the postoperative tracing this high end diastolic pressure has disappeared and the relationship of diastolic to systolic pressure is now within normal limits.

The circulation time, total blood volume, and cardiac output have been calculated by one of us (Gunton) on the Hamilton dye dilution principle. Fig. 8 illustrates the dye dilution curve obtained preoperatively, and 3 weeks and 13 months after operation. This illustrates graphically the return to normal over a period of time.

SUMMARY

1. The importance of a radical pericardectomy for constrictive pericarditis is discussed.

2. A preliminary report of 13 subtotal pericardectomies is presented with results based on a follow-up of one to three years.

3. Clinical results and hæmodynamic studies thus far would suggest that an important factor in success is adequate excision of pericardium.

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RÉSUMÉ

La péricardectomie depuis son institution a évolué vers une hardiesse grandissante dans l'ampleur de l'exérèse. L'analyse des dossiers de l'Hôpital général de Toronto, de 1939 à 1950, semble justifier cette tendance. Les auteurs considèrent comme devant être opéré tout malade ayant une péricardite constrictive avec pression veineuse élevée, œdème et ascite. Cependant, si le diagnostic de péricardite constrictive est basé sur un examen radiologique sans qu'il y ait de signes cliniques, il faut, avant de songer à l'acte chirurgical, s'assurer que la lésion soit bien une cause de gêne au travail du myocarde. Le cathétérisme du ventricule offre la réponse à ce problème: une augmentation de la pression à la fin de la diastole indique que la lésion entrave la fonction cardiaque.

La digitale est employée comme tonicardiaque dans la période préparatoire à l'intervention, et est continuée pendant plusieurs mois après, afin d'éviter la dilatation. Une incision transversale du sternum ouvrant les deux côtés de la poitrine offre le champ le plus sûr. On enlève tout le péricarde couvrant les ventricules de la pointe à la surface diaphragmatique. La dissection peut s'étendre aux veines caves ainsi qu'aux hiles pulmonaires. L'âge moyen des treize cas présentés dans cet article était de 29 ans. Tous avaient une pression veineuse élevée et plusieurs d'entre eux étaient impotents. Un mortalité opératoire (maladie coronarienne non prévue), une autre postopératoire (défaillance hépatique) laissent dix survivants dont sept sont en excellente santé et deux autres se portent bien. Un autre cas est en voie d'amélioration, et le dernier est de date trop récente pour permettre une évaluation satisfaisante. M.R.D.

PSYCHO-SOCIAL AND REHABILITATIVE ASPECTS OF UPPER EXTREMITY AMPUTEES*

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SEVERAL STUDIES have been conducted at the Rehabilitation Institute of Montreal on psycho-social and rehabilitative aspects in cases of paraplegia, hemiplegia and amputations of the lower extremity. Although studies have been made on Workmen's Compensation, insurance and veteran cases, very little literature is available on the total rehabilitation of the indigent and non-protected cases.

It is planned to combine all results later, and to study variations in rehabilitation and results in the different disability groups. Only part of our findings will be discussed here.

Location of study:

This study took place at the Rehabilitation Institute of Montreal, a private organization set up to provide all modalities of physical medicine and rehabilitation, including placement services in collaboration with the Ministry of Labour.

Cases:

During the last five years, a total of 52 upper extremity amputees were referred; the group comprises 41 males and 11 females. However, only 47 reported for evaluation; the remaining 5 had been advised by social agencies to report, but enquiry revealed long-standing disabilities and total independence as regards activities of daily living.

The shortest period between amputation and referral is two months; the longest is the incredible period of 50 years.

TABLE I.

REFERRAL OF CASES

Origin	*Number*	*Percentage*
Hospital	2	3.85
Welfare groups	8	15.38
Self	37	71.15
Physicians	5	9.62
Total	52	100.0

Table I shows the origin of the referrals, indicating the percentage in each case. It is worthy of mention that the majority of the patients (71.15%) came without outside reference, whereas for lower extremity amputees the figure was only 24%. Undoubtedly, many of the patients in this project came out of mere curiosity.

TABLE II.

AGE OF 52 UPPER EXTREMITY AMPUTEES

Age group	*Number*	*Percentage*
0 - 14	3	5.77
15 - 29	23	44.23
30 - 44	12	23.08
45 - 59	10	19.23
60 - 74	4	7.69
Total	52	100

*This work was made possible through the Biermans Foundation for Research in Rehabilitation. The communication was read at the Fourth Annual Meeting of the Canadian Association of Physical Medicine and Rehabilitation, London, Ont., June 1956.

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Nov. 15, 1956, vol. 75

Study of Table II shows that the majority of the referred cases were in the 15-44 year age group. The younger group is larger because of the higher incidence of agenesis, which seems to occur more frequently in the upper than in the lower extremities.

Methods:

The ensuing procedures were followed during this study. Of the 47 patients who benefited from rehabilitation appraisal, 30 reported later for a follow-up after contact by letter or telephone. The follow-up discloses 2 deaths; 3 cases could not be located; 3 refused re-evaluation and 8 out of 14 replied to questionnaires. Consequently, results are based on 38 cases.

TABLE III.

PROCEDURES AT FOLLOW-UP

Procedure	*Number*	*Percentage*
Examined at the Institute	23	60.53
Examined in a nursing home	1	2.63
Examined at home	3	7.90
Examined at work	2	5.26
Examined at school	1	2.63
Replied to questionnaire	8	21.05
Total	38	100

Table III shows that 60% of the follow-up cases were examined at the Institute, whereas in a study on hemiplegia only 47% reported. This would confirm that it is much more difficult to organize rehabilitation for the latter group. Visits to the listed locations were made by a team comprising a physiatrist (V.S.), a psychiatrist (L.M.), a psychologist (J.-M.C.) and a social worker (R.V.).

The survey is divided into three parts: (1) Study of records of previous treatment and hospitalization. (2) Rehabilitation procedures and results. (3) Findings at follow-up.

The shortest and longest periods between screening and follow-up were 10 months and 5 years, respectively.

PART I. PREVIOUS HISTORY

Civil status:

Findings were not as significant as in our studies of paraplegic, hemiplegic and lower extremity amputation cases; the group comprised 15 married, 35 single, 1 widowed and 1 separated.

TABLE IV.

EDUCATIONAL LEVEL

Level	*Number*	*Percentage*
Illiterate	1	1.9
Primary	34	65.4
Elementary	10	19.2
High school	6	11.6
University	1	1.9
Total	52	100

Educational level (Table IV):

Most patients had reached primary and elementary levels, as in the case of paraplegics, hemiplegics and lower extremity amputees.

TABLE V.

ETIOLOGY OF 52 UPPER EXTREMITY AMPUTEES

Etiology	*Number*	*Percentage*
Vascular	1	1.92
Infectious	6	11.54
Congenital	6	11.54
Traumatic	31	59.62
Tumour	3	5.77
Unconfirmed diagnosis	5	9.61
Total	52	100

Etiology (Table V):

Results are interesting if we compare them with those obtained in lower extremity amputations. Only 1.9% of the cases were of vascular origin, as against 64% in a group of 90 lower extremity amputations. Moreover, trauma accounts for 60% of upper extremity amputations but only 21% in the lower extremity.

Type of amputation (Table VI):

Two patients had amputations of both upper extremities; one had two below-elbow and the other two above-elbow amputations. Right-sided amputations are predominant, the most common site being the upper third of the arm. Only two clients were left-handed.

Findings at first examination—screening:

The survey showed that all trauma victims had been hospitalized immediately after injury; all patients with tumours or vascular lesions had also been in hospital. The ages of the patients with congenital lesions were: 19, 23, 21, 17, 21 and 38. Surprisingly enough, none of these had ever benefited from treatment or rehabilitation

TABLE VI.

TYPE OF AMPUTATION

Site of amputation	Right Number	Right Percentage	Left Number	Left Percentage
Upper arm: upper third	10	19.2	2	3.8
middle third	6	11.6	1	1.9
lower third	2	3.8	4	7.7
Forearm: upper third	3	5.8	3	5.8
middle third	5	9.7	6	11.6
lower third	1	1.9	—	—
Hand and fingers	6	11.6	—	—

procedures. Of all patients previously hospitalized, only one ever received any form of physiatric treatment.

PART II. PROCEDURES AND RESULTS

Measures recommended (Table VII):

A large number of cases were recommended for two or more rehabilitation services. Thirty-eight cases, or 80.85%, were accepted for treatment. Nine cases, or 19.15%, were not accepted for rehabilitation, for the following reasons: (a) Four patients were totally independent and met acceptable rehabilitation standards. (b) No existing facilities were available at the Institute at the time for two of the referrals. (c) The general condition of three patients was too poor to permit rehabilitation.

TABLE VII.

REHABILITATION MEASURES RECOMMENDED

Recommendations	Number	Percentage
Hospitalization	2	4.26
Surgical revision of stump	2	4.26
Physiotherapy	13	27.66
Occupational therapy	13	27.66
Psychological evaluation	8	17.02
Medical social service appraisal	47	100.0
Vocational and placement evaluation	19	40.43
Prosthetic	17	36.17
Rejected after medical examination	9	19.15

TABLE VIII.

PROSTHESES PRESCRIBED AND PROVIDED

Type of prosthesis	Number	Percentage
Utility arm and hook	5	10.64
Interchangeable cosmetic hand and hook	10	21.88
Dress arm and skin glove	2	4.25
Total	17	36.17

Prostheses provided (Table VIII):

Prosthetic appliances were recommended and provided in only 17 cases, that is, 36.17% of the 47 evaluated cases. Training in the use of prosthesis was provided in all instances. A prosthesis was not recommended for the 30 remaining patients, because they were totally independent or their general condition was too poor to permit beneficial use. In other instances, it was felt that the intelligence was not sufficient to allow the subject to benefit fully from the prosthesis.

PART III. FOLLOW-UP

Findings at follow-up:

Examination and evaluation were more complete at follow-up and greater emphasis was placed on the psychiatric and psychological aspects, as well as on associated conditions present earlier or developed in the interval between screening and follow-up.

TABLE IX.

RECOMMENDATIONS AT FOLLOW-UP

Recommendations for	At follow-up	At screening
Prosthetic appliances	2	17
Physiotherapy	1	13
Occupational therapy	1	13
Psychiatric evaluation	30	—
Psychological evaluation	28	8
Vocational and placement	8	19

Table IX establishes comparison between recommendations made after the first examination and at follow-up. As regards recommendations for prosthesis, in one case the appliance was worn out and had to be replaced, and in the other the patient had refused a prosthesis at first examination, but claimed that it was now needed for his work.

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TABLE X.

ASSOCIATED CONDITIONS

Conditions	*Number*	*Percentage*
Vascular	5	13.16
Trauma involving other limbs	4	10.53
Neurological disease	3	7.90
Grave psychiatric involvement	4	10.53
Blindness	2	5.26
Cancer	1	2.62
Total	19	50.0

Associated conditions:

Table X is included to indicate the various associated conditions obstructing rehabilitation attempts.

Independence for activities of daily living:

It was found that 37, of whom 16 had benefited from specific treatment, were now totally independent as regards activities of daily living. For the purpose of testing, amputees were compared with the physically normal.

Use of prosthesis:

Seven patients (41.28%) are making everyday use of the prosthesis provided. Ten patients (58.8%) provided with a prosthesis were not using them at follow-up for the following reasons.

(a) Eight patients considered themselves sufficiently independent without an artificial limb, for all activities of daily living and work. (b) One, with amputation of an upper and lower limb, lives in a nursing home where the use of his prosthesis is not encouraged. (c) One patient had developed psychiatric conflict after receipt of the prosthesis.

Occupational aspect (Table XI):

Of the 38 patients who received physical medicine and rehabilitation services, 18 (47.37%) are working, 5 (13.15%) are at school or university, 12 are not working but are independent for activities of daily living (31.58%), and 3 (7.9%) are in institutions for the following reasons:

(a) One has an amputation of one arm and one leg; (b) One is committed to a mental institution; (c) One is hospitalized for tuberculosis.

Psychological findings:

Psychological evaluations were requested in 8 cases at first screening. Twenty-three appraisals, including Wechsler-Bellevue (and Ottawa-Wechsler) and occasionally other tests, took place at follow-up in order to evaluate placement adaptability to handicap and intelligence factors.

The results of the tests, with reference to intelligence quotient (I.Q.) and employment or educational aspect, show the following:

Patients with average or above average I.Q. (90-127) were all employed at follow-up. On the other hand, those of average or above average I.Q. but psychologically considered unfit to work because of serious personality problems were unemployed.

Patients with below-average I.Q. (50-89), in the fit-to-work group, were found employed at follow-up though on screening they had not been working. However, these two patients had a relatively good I.Q. in the below-average group: 80-89.

On the other hand, patients classified on screening as unfit to work, by virtue of an I.Q. in the 50-79 range, were unemployed at follow-up.

TABLE XI.

EMPLOYMENT ASPECT

Screening recommendations	*Previous to screening*				*Follow-up*			*Grand total*
	I.Q.	*Employed*	*Unemployed*	*Total*	*Employed*	*Unemployed*	*Total*	
Fit to work:	50–89	0	2	2	2	0	2	4
	90–127	8	5	13	13	0	13	26
N		8	7	15	15	0	15	30
Unfit to work:	50–89	1	4	5	0	5	5	10
	90–127	3	0	3	0	3	3	6
N		4	4	8	0	8	8	16
Grand total		12	11	23	15	8	23	46

Psychiatric findings:

1. The psychology of a patient did not seem to be modified grossly by the extent of the physical limitation suffered, or by the extent of possible rehabilitation. The most important factor in adaptation to disability seems to have been in reverse proportion to the amount of discrepancy existing between the ideal self and the one that actually existed. For example, an arm is less important to a man who visualizes his ideal self in function of his intelligence and feels less concerned about the integrity of his arm. On the contrary, rehabilitation might be poor in a "doer" who attributes great importance to his hands as tools.

2. In congenital defects, the body image did not include the absent limb, with the consequence that the subject had adapted to life without it and, if given a prosthesis, interpreted it as being too long or cumbersome. Previous reasonable adaptation was destroyed by the addition; shyness and self-consciousness set in, and in one case was conducive to severe neurotic depression in a boy of 17.

3. The presence of a tumour or an infection of a limb that would severely hinder activities of an otherwise normal person did not mean that amputation would be accepted better as a relief, since it seemed that the subject was not holding on to his affected limb but rather to the ideal image of a "would-be-perfect" limb.

The defence mechanism against anxiety seems to have been primarily towards denial, which in at least six cases took the form of hypomania. In one of these cases, however, there was a readily visible alternation with depression bouts and attempted suicide.

Reaction formation was present in six cases but did not necessarily hinder adaptation. Only two of these had intense hostility that, through intrajection, resulted in psychotic depression.

Though the number of cases is limited, one feels that agenesis of a limb or early impairment would be conducive to good adaptation to disability, but extremely poor to rehabilitation with a prosthesis. Severance of an upper limb at adolescence would cause more psychological difficulties, but still favour rehabilitation: this might be explained through the already acquired independence. Severance of an upper limb in a person over 25 with dependents could be conducive to fair physical rehabilitation but poor adaptation to working situations, through either depression from a lowered income, or resentment of circumstances. In two previously paranoid personalities this resulted in projection upon a firm or society of personal difficulties.

CONCLUSIONS

1. The study shows that the male group of upper limb amputees is four times greater than the female.

2. The number of self-referred cases in upper extremity amputations is much larger than in any other disability group studied at the Institute.

3. It appears that agenesis occurs more frequently in the upper extremity than in the lower.

4. Conclusions about civil status are not significant.

5. A vascular origin is far commoner in extremity amputations, whereas the situation as regards trauma is quite the reverse.

6. It seems quite evident that in the past 30 years very little has been offered in the surgical or prosthetic field to patients with agenesis of the upper extremity.

7. The survey shows that a prosthesis was prescribed and provided in only one-third of the referred cases.

8. Upper extremity amputees, particularly those with agenesis, showed amazing physical potentialities towards independence for activities of daily living without the benefit of treatment or prosthesis.

9. In spite of careful physiatric evaluation and instruction on the use of prostheses, it was found at follow-up that only 41.28% of the cases were making full use of them.

10. Psychological study at follow-up revealed that those with a normal or above-normal I.Q., irrespective of services received, were able to find work.

11. It appears that all patients suffering amputation of an upper limb, whatever the etiology, should be subjected to a full battery of rehabilitation evaluations, including physiatry, psychiatry and psychology.

12. Although our psychiatric experience is limited, it is felt that, before a prosthesis is issued, not only the expected objective benefit and the amount of hindrance actually existing should be assessed but, above all, a careful evaluation should be made of the reality compared with the possible unrealistic expectations of the patient.

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WOUNDS OF THE MYOCARDIUM

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IN RECENT YEARS, pioneers in the field of heart surgery have made spectacular advances, to the extent that elective operations, impossible of performance ten years ago, are now being performed almost routinely in specialized centres. It is evident, however, that traumatic conditions of the heart and pericardium will still, on occasion, present themselves to the general surgeon far from a cardiovascular unit. With these cases he can and should deal; no special equipment is needed beyond that normally available in any general hospital.

Having been faced ourselves with two such cases, and being fully aware that we may face similar problems in the future, we thought it of interest to review literature published on the subject and to evaluate our own limited experience.

CASE REPORTS§

CASE 1, Mrs. M.S., 29-year-old woman.

History.—Having written a suicide note to her family, this patient shot herself through the chest with a .22-calibre revolver. She was found sitting upright in a chair, almost at once, by her husband who brought her directly to hospital.

Physical examination.—The wound of entrance was found on the anterior chest 1½ inches to the left of the sternum at the level of the sixth interspace. The wound of exit was found 3 inches to the left of the midline of the back at the level of the 12th rib. Blood pressure was 120/70, pulse full and regular at a rate of 114. Heart sounds were well heard and were normal, and both lung fields were resonant throughout with normal vesicular breath sounds. The abdomen was rigid throughout, especially in the upper half with marked rebound tenderness, and bowel sounds were absent. The patient was apprehensive, very pale and in obvious oligæmic shock in spite of the blood pressure readings and pulse rate. She was in her third month of pregnancy.

X-ray and laboratory investigations.—Hæmoglobin value was 11 g. per 100 c.c., hæmatocrit 37 and white cell count 16,800. The urine contained four-plus sugar with no acetone or albumin and was clear on microscopic examination. A six-foot radiograph of the chest taken with the patient upright revealed no air under the diaphragm and no evidence of pneumothorax, hæmothorax or mediastinal emphysema; the heart was quite normal in size and configuration. The left diaphragmatic dome was slightly elevated.

Immediate treatment.—Whole blood transfusion with Rh-negative, type O blood was started almost immediately on arrival. The patient was given tetanus antitoxin and intramuscular penicillin and was then transferred directly from the x-ray department to the operating room. Induction was carried out with thiopentone (Pentothal) and curare, and anæsthesia was carried on with endotracheal ether, using the closed CO_2 absorber technique. Atropine, grain 1/150, was the only premedication used.

Operation (February 11, 1955).—The abdomen was opened through a left upper abdominal paramedian incision; 2,000 c.c. of blood was encountered in the peritoneal cavity and the source of bleeding was found to be the splenic pedicle. There were, in addition, two holes in the stomach, one high up anteriorly near the lesser curvature and another posteriorly near the greater curvature in the region of the splenic pedicle. The spleen was immediately removed after triply clamping the pedicle en masse, and attention was turned towards closure of the gastric wounds. However, it soon became apparent that bleeding was continuing at an alarming rate, though no longer from the splenic pedicle. On investigation it was found that bright red blood was spurting through a small hole in the left lobe of the liver. On reflection downward of the left hepatic lobe, this blood was ultimately seen to be coming through the dome of the diaphragm and undoubtedly from the pericardial sac. The original incision was therefore extended upward in the midline of the chest and, after the retrosternal space was cleared with the index finger, the sternum was split from below upward to the third rib level. The pericardial sac was then opened in the midline anteriorly and the diaphragm was also incised in the midline to give exposure to the heart. The heart was pumping blood out of the left ventricle with each beat through two apertures, one anteriorly near the apex and the other posteriorly. Each perforation was at once closed with two simple sutures of chromic catgut, taken deeply into the muscular wall but not through the entire thickness. Care was taken in the case of the anterior perforation to avoid the anterior descending branch of the left coronary artery which passed within two millimetres of the perforation. After complete examination of the small bowel had shown it to be free of injury, the wound was closed. The pericardial sac was left widely open and a small defect was left in the diaphragm so that the pericardial sac and the peritoneal cavity would remain in free communication.

Course.—Before, during and after operation the patient received 3,500 c.c. of whole blood intravenously. Postoperatively, the hæmoglobin value was 11 g. per 100 c.c. and the blood pressure was 110/80, pulse 118, full and regular. Penicillin and streptomycin were administered in large doses and intragastric suction was maintained until bowel sounds were heard. The oxygen tent was removed after 24 hours. On the second postoperative day the patient developed a pericardial friction rub with a palpable thrill, but heart sounds were well heard and effusion was not detected by fluoroscopy. Because there were no signs of failure, digitalization was not carried out. On the fourth postoperative day the patient was out of bed, at which time, though bowel sounds had returned, the friction rub persisted. On the seventh day the patient complained of dyspnœa and retrosternal pain radiating through to the back. Blood pressure was 100/50, pulse was 132, and the neck veins were somewhat distended. The friction rub was absent. Immediate tap obtained 210 c.c. of blood-tinged pericardial fluid from which no organisms grew on routine culture. Withdrawal of this fluid completely relieved the signs and symptoms of tamponade and the blood pressure returned to 120/75. From this point onward, recovery was uneventful and the patient was discharged on the 20th hospital day. No explanation was found for the original finding of sugar in the urine. She did not prove to be a diabetic. Several postoperative electrocardiograms were well within the limits of normal. Her

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pregnancy terminated seven months postoperatively with the spontaneous hospital delivery of a normal male infant. To date, a long scar remains the sole complaint of this patient.

This case represents, apart from the injuries to splenic pedicle, stomach, liver and diaphragm, a type of cardiac injury (exsanguination without tamponade) which demands immediate surgical intervention if the patient is to survive. Accurate preoperative diagnosis, moreover, may be virtually impossible since, without tamponade, pericardial tap is likely to be fruitless,[1] the electrocardiogram unreliable[1, 3] and cardiac silhouette, of course, quite normal. However, if blood escapes from the pericardial sac in appreciable quantities, it should reveal itself, apart from the general signs of blood loss, either on physical examination of the abdomen or on x-ray examination of the pleural cavities. A positive finding by either of these methods, combined with a presumptive path of bullet or knife blade, is surely an urgent indication for exploration of the heart and anterior mediastinum, although in some instances the source of bleeding will be found to be an intercostal vessel or the internal mammary artery.[2]

CASE 2, D.B., 3-year-old girl.

Having been premedicated with atropine and morphine, this three-year-old child was taken to the operating room for tonsillectomy and adenoidectomy (December 14, 1954). During induction of anæsthesia with vinethene and ether, the heart stopped. The otolaryngologist in the room at the time was unwilling to open the chest for massage of the heart. The anæsthetist then courageously undertook open thoracotomy while an assistant maintained oxygenation by means of positive pressure. Several minutes later when one of us (J.D.H.) arrived at the urgent request of the operating-room supervisor, the following situation was encountered.

The chest was opened through the fifth interspace anteriorly, the incision having been carried medially to transect the sternum and both internal mammary arteries. Unfortunately, the left ventricle had been incised transversely for a distance of one inch, and blood was pouring forth from this wound and from the internal mammary arteries. The heart, meanwhile, had regained normal rhythm and was beating regularly at 120 beats per minute. The intercostal incision was rapidly extended laterally into the axilla and the ribs were spread to give adequate exposure to the heart. The pericardial tear was extended upward toward the base of the heart, care being taken to avoid the phrenic nerve. The left ventricular wound was closed with three interrupted, simple sutures of catgut taken deeply into the myocardial wall, assiduously avoiding the coronary arteries. The internal mammary vessels were secured before closure of the chest. A thoracotomy tube was left in the chest and was brought out to underwater drainage. Penicillin and streptomycin were left in the chest, since the operation had been done without the benefit of asepsis. The pericardial sac was left widely open. Tracheotomy was added to avoid any element of postoperative upper respiratory obstruction due to the rather large tonsils which had brought the patient to hospital. Recovery was quite uneventful. There was at no time evidence of sepsis, heart failure, pericardial effusion or tamponade. The tonsils were successfully (though circumspectly) removed at a later date.

This case illustrates a fact often demonstrated before, both clinically and experimentally, that the normal heart possesses an astounding degree of reserve and a fortunate ability to tolerate some of the most damaging of mechanical insults. This is one of the facts which we must bear in mind and of which we must take full advantage when confronted with wounds of the myocardium. Comment on the nature of the events leading to an incised wound of the left ventricle in this case does not lie within the province of this presentation.

DISCUSSION

Such cases as are herein reported are not unique or even rare. The first successful cardiorrhaphy was reported by Rehn, from Germany, as long ago as 1897.[4] Since that time several hundred successful cases have been reported, along with several hundred unsuccessful cases. The knowledge and experience thus gained has given rise to a fairly standardized classification of cardiac injuries and a rewarding degree of concurrence on their management.

The classification reasonably used is similar to the classification of wounds elsewhere, namely, into perforating (as in Case 1), penetrating (as in Case 2) and blunt (such as blast injury).[5-7] For purposes of treatment and for the understanding of two different physiological lesions, it is necessary to further classify cardiac wounds according to the presence or absence of tamponade. Tamponade will obviously not occur if the wounding weapon or missile has, at the time of wounding, made a ready point of egress for blood from the pericardial sac either into the pleural cavity or the abdominal cavity or to the outside. In this instance, should the patient survive to see a doctor, the clinical picture of progressing exsanguination is in marked contrast to the clinical picture presented by the patient with cardiac tamponade.

Diagnosis.—The possibility of trauma to the heart should be considered in all perforating injuries of the neck, axilla, chest or upper abdomen.[1, 2, 8] It is not necessary to describe the clinical picture of tamponade, or the picture of pronounced shock which will occur if tamponade is absent in the presence of a bleeding cardiac wound. It must be realized, however,

that the two clinical pictures will appear in varying combinations in the instances where the pericardial tear allows some leakage of blood but is inefficient in preventing tamponade. Or, the picture may rapidly change as a pericardial rent becomes sealed whereas it was formerly patent. It must be remembered, too, that part of the clinical picture of tamponade itself is pronounced hypotension with a fading pulse. In milder cases of tamponade, radiography and fluoroscopy of the heart will be of great help in confirming its presence. In more severe cases where the clinical picture is clear (as in Case 1 postoperatively) and particularly when it occurs following a recent wound, it would seem wiser to accept the clinical diagnosis and proceed at once with tapping of the pericardium. When tamponade is present, nothing will improve the condition of the patient except removal of the pericardial blood either by tap or by operation. In fact, if the condition is significantly improved by any other measures, the diagnosis of tamponade must be held seriously in doubt. In the presence of tamponade, the finding of incoagulable blood on pericardial tap is diagnostic of myocardial damage[9] though, because of appreciable amounts of clotted blood within the pericardial sac[1] or for other technical reasons, tap may be negative though bleeding is continuing.

Tamponade.—Tamponade may be the initial salvation of the patient with a cardiac wound, in its action of bringing pressure to bear on the bleeding heart wall,[2, 8, 10] but it may later lead to an unfortunate outcome because of its physiological sequelæ.[2] Briefly:

1. On the arterial side, tamponade induces decrease in cardiac output with a consequent fall in blood pressure and decrease in coronary filling, with, consequently, further decrease in the minute volume output.

2. On the venous side, the increased pericardial pressure is reflected in the atrial and vena caval pressures. Since filling of the right atrium is dependent upon a pressure gradient between the vena cava and the right atrium, cardiac filling is decreased or prevented when this pressure gradient is reduced or abolished by tamponade.

Experimentally in dogs,[9] critical levels of pericardial pressure have been produced such that the further injection of 20 c.c. or more of saline equalized pericardial and venous pressures, suppressed cardiac filling and reduced arterial pressure to zero. In fact, all cardiac action ceased. Relief of this pericardial pressure rapidly reversed the situation.

Treatment.—Those perforating or penetrating wounds of the myocardium unassociated with tamponade require immediate operative intervention as the only means by which exsanguination and death can be prevented. As illustrated by Case 1 (where the presumptive path of the bullet was questionable), accurate preoperative diagnosis may be impossible, so that exploration should be carried out where there is reasonable suspicion of cardiac damage. Maynard[2] recommends that neither venous pressure readings nor pericardial tap be done routinely, advising exploration on the mere suspicion of a cardiac wound even in those cases showing tamponade. In his series over a period of 14 years and in 81 cases, exploration was only carried out on six occasions for what proved to be internal mammary or intercostal bleeding.

Delay in operation may well be indicated in many, if not most cases presenting with tamponade. Reduction of pericardial pressure by tap will at least improve the circulation by improving the efficiency of the central pump so that, even if suture of the myocardium becomes necessary, the patient is thus placed in a better position to withstand operation. Such management is based on the reasonable and substantiated assumption[9, 11, 12] that many such wounds will seal off of their own accord and be aided in so doing by moderate degrees of tamponade. In the meantime, supportive care must include pericardial tapping as often as is necessary to allow cardiac filling to take place more or less normally, so that the minute volume output of the heart may be adequate for the maintenance of a reasonable blood pressure. If the wound does not seal off promptly under this management, operation must be carried out in order to repair the myocardium by suture. Many surgeons[7, 13, 14] prefer to operate in all cases and not to depend upon any natural tendency toward sealing off of the wound.

Associated injuries are naturally many and varied, especially in the case of gunshot wounds. Such associated lesions as sucking wounds of the chest and pneumothorax must, of course, receive appropriate attention.

Prognosis.—Many — probably most — patients who receive injuries to the heart never reach

medical aid alive.[15] This is particularly true of injury by flying missiles such as shrapnel or bullets, in which reports of survival are quite uncommon. Those reported usually involve missiles of smaller calibre (such as in Case 1). Cases coming to the surgeon are so few in number and so varied in complexity that figures attempting to determine survival rates are fraught with fallacies. Similarly, figures comparing survival rates after operative and non-operative management are somewhat less than enlightening when one considers that those patients in whom conservative therapy is applicable have entirely different physiological lesions from those in patients requiring immediate operation because of exsanguination. Survival depends, too, to no small extent, upon the nature of and the treatment given to associated lesions. Consider, for instance, the outcome in Case 1 had we been able to make the correct cardiac diagnosis preoperatively, had we explored and repaired the heart and taken the abdominal findings to be due to blood leaking through the diaphragm! Very many of the deaths reported in the literature are not due to the cardiac lesion *per se*, but to such associated lesions, for instance, as head injuries.[2]

From a careful review of available literature, and from our own experience, it is fair to state that if a patient with a cardiac wound reaches medical aid alive and if the associated lesions are not in themselves lethal, the chances of survival under prompt and appropriate treatment are very good indeed.

SUMMARY

Two cases of infrequent occurrence and of considerable surgical interest have been presented, together with a general discussion of perforating and penetrating wounds of the myocardium.

The present authors wish to emphasize that, because of the urgent nature of these injuries, it is incumbent upon the surgeon who first sees the patient to assume complete responsibility, operative or non-operative, for his care. We feel that the corollary is equally important, namely: the diagnostic and therapeutic equipment necessary for the proper management of these cases is available in the average general hospital.

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PYRAZINAMIDE-ISONIAZID IN LOW DOSAGE IN TREATMENT OF PULMONARY TUBERCULOSIS

Pyrazinamide in combination with isoniazid, both drugs in low dosage, was administered to 69 previously untreated, carefully selected patients with pulmonary tuberculosis. The results were compared with those observed in 54 patients treated with streptomycin and para-aminosalicyclic acid (PAS). Patients were assigned to either of the two regimens by chance.

Thirty-eight patients who received pyrazinamide (1.5 g.) and isoniazid (150 mg.) daily, and 28 "controls" who received streptomycin (1 g. twice weekly) and PAS (12 g. daily) have completed eight months of therapy.

The pyrazinamide-isoniazid patients surpassed the controls in sputum culture "conversion", roentgenographic improvement, and cavity closure, but there was more drug resistance in this group than in the streptomycin-PAS controls.

Pyrazinamide toxicity was not alarming with the low dosage used, and only one patient of 69 treated became jaundiced. It appears that low-dosage pyrazinamide-isoniazid is a very adequate treatment regimen when used under conditions similar to this study for periods not exceeding eight months of treatment. At the end of eight months the pyrazinamide should be discontinued and the patient continued on isoniazid, together with newly added PAS, or both pyrazinamide and isoniazid should be discontinued and streptomycin plus PAS substituted.—S. T. Allison: *Am. Rev. Tuberc.*, 74: 400, 1956.

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Case Reports

NEONATAL HEPATITIS
INCLUDING A CASE ASSOCIATED WITH MATERNAL HEPATITIS DURING PREGNANCY

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IT HAS BECOME apparent in recent years that a significant proportion of cases of neonatal jaundice simulating biliary duct atresia are due to viral hepatitis. In some series this proportion has been as high as one-third.[1, 3] The importance of the condition lies in differentiating it clinically from duct atresia, because the mortality is greatly increased if the abdomen is explored.[1] Hepatitis is much more serious in the neonatal period than in adult life; Gellis *et al.*, in their large series, found a mortality of 19% and an incidence of persistent jaundice and cirrhosis of 10%. Many of these unfortunate patients had undergone laparotomy.[1]

The clinical picture is one of jaundice and hepatomegaly beginning at an age varying from two days to eight weeks or more. Systemic manifestations, such as vomiting and inanition, which are absent in early duct atresia, are usually marked in hepatitis. Difficulty arises because the jaundice resembles that due to obstruction, with a high direct serum bilirubin and negative flocculation tests. The stools may be acholic, but repeated examination will usually disclose the presence of some bile. Important differential evidence is often given by serial bilirubin determinations, which show a steady rise in duct atresia, but may fluctuate in hepatitis.[2] A short course of cortisone may be very helpful in lowering the serum bilirubin, because of its choleretic action.[1, 4] Harris *et al.* give a good account of the differential diagnostic features, wherein they state that the zinc turbidity test is sometimes positive in neonatal hepatitis when the thymol and cephalin tests are negative.[5] Cirrhosis, and even malignancy,[6] have been reported as sequelæ to neonatal hepatitis.

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It is generally recognized that there are two types of viral hepatitis, each caused by a separate organism.[7] The commonest is infectious hepatitis, which has an incubation period of about 30 days. The virus is spread by oral ingestion of material contaminated with fæces which contain the virus. The other type, homologous serum hepatitis, has an incubation period of about 100 days. The virus does not appear in the stools, but may be present in the blood stream for long periods. It is not infective by mouth, but is spread by parenteral administration of blood or blood products. No method of culturing these viruses is available, either *in vitro* or in animals, and the only way of proving their presence is by administration of the suspect material to human volunteers. Both conditions produce indistinguishable clinical and post-mortem pictures.

Available information suggesting that neonatal hepatitis is caused by a virus is as follows.

The histological picture, described in 1952 by Craig and Landing,[8] resembles that present in adult hepatitis.[9] They state that all the histological criteria for diagnosing viral hepatitis, as given by Weisbrod *et al.*,[10] may be found in neonatal hepatitis. Some of these criteria are: intralobular necrosis, portal inflammation, ballooning of hepatic cells, multiple nuclei, irregular cell cords, and intralobular exudate. The main difference between the neonatal and adult forms is that in the former, balloon and giant cells are prominent, while in adults necrosis is the outstanding feature. The reason for this difference is not known; it has been suggested that the infantile liver is resistant to necrosis because of its better blood supply.

The clinical picture, with usual spontaneous recovery, is similar to that of viral hepatitis. The other causes of neonatal jaundice, such as biliary obstruction, erythroblastosis, hæmolysis, and syphilis, are absent.

Stokes reported in 1951 that he had succeeded in infecting a volunteer with viral hepatitis (apparently of the homologous serum type) by injecting blood from a baby with neonatal hepatitis. Viral hepatitis was also caused, in another volunteer, by injecting blood from the baby's mother.[11]

The route of infection has not yet been proved. It is generally accepted that acquired infectious hepatitis of the ordinary icteric variety is rare in the newborn,[12] because of their maternal antibodies. Capps *et al.*[13] recently re-

ported an epidemic of infectious hepatitis which took place in an orphanage, where presumably a large number of young infants were at risk. Of the 36 cases which occurred under the age of three, 35 were subclinical, and were detected only by liver function tests. Only four of these cases occurred under the age of five months. This suggests that young infants are resistant to infectious hepatitis. The newborn are susceptible, however, to homologous serum hepatitis, acquired by blood transfusions and serum injections.[14-17] This susceptibility is probably due to the fact that the homologous serum hepatitis virus does not stimulate the production of antibodies (as does the infectious hepatitis virus), and therefore newborn babies do not have any circulating antibody against it, acquired from their mothers. This also accounts for the failure of gamma globulin to prevent homologous serum hepatitis[18, 19] and its efficacy in preventing infectious hepatitis.[20, 21]

The interval between birth and the onset of jaundice in many instances is much less than the incubation period of either type of viral hepatitis, suggesting that the infection occurred *in utero*.[22] The age of the histological lesions in some cases indicates that the process began before birth.[23] A large number of cases occurring in siblings have been reported.[1, 22, 24, 25] The above evidence would tend to show that infection takes place via the transplacental route.

When the mothers are examined, however, evidence of overt hepatitis is absent. Only one previous case has been found in the literature of neonatal hepatitis following maternal hepatitis during pregnancy.[26] Several large series of cases of infectious hepatitis occurring during pregnancy have been reported, and it has been established that the virus does not cross the placental barrier, although an increased incidence of abortion and fetal abnormalities does result.[27-33]

On the other hand, it is well known that bloodstream carriers of homologous serum hepatitis are usually asymptomatic, and have had no previous episode of clinical hepatitis.[34-36] However, they frequently give abnormal results of liver function tests, usually a positive thymol turbidity.[37] Some workers have done liver function tests on the mothers of babies with neonatal hepatitis, and found similar abnormalities.[24, 25] The only way to prove the carrier state is by injection of volunteers, and this has been carried out only once, by Stokes (see above).

Thus it seems not improbable that neonatal hepatitis is due to homologous serum hepatitis virus acquired transplacentally from mothers who are asymptomatic carriers. This view is given support by the following case, in which the mother had apparent homologous serum hepatitis during pregnancy, which was transmitted to the baby *in utero*, and in which autopsy material is available on both mother and child.

CASE 1—*Mother.*

Mrs. V.H., a 26-year-old primipara, was first seen in the second month of her pregnancy. She had no history suggesting previous hepatitis or exposure to it. Her physical condition was good, but it was obvious that she was suffering from schizophrenia and she was therefore admitted to the Crease Clinic. Her treatment there included about 40 injections of insulin (but no blood serum), with needles that were boiled 10 minutes before use. None of the other patients contracted hepatitis while they were in hospital. She was discharged on January 28, 1955, after three months of treatment, and remained well until April 10, in the seventh month of her pregnancy, when she began to have severe nausea and vomiting. She was delivered of a 2,200-g. female infant the following evening. It was noted that she had yellow scleræ, hepatomegaly, and bile-stained urine after delivery, and she was admitted to the Infectious Diseases Hospital. In spite of treatment with ACTH, intravenous fluids, and antibiotics, her condition became steadily worse, her liver decreased in size, and she died five days after delivery.

Laboratory findings: Urine, April 13: white cells 1+, red cells 3+, protein 2+, bile pigments 4+. Blood picture April 13: hæmoglobin 97%, E.S.R. 17 mm./hr., white cells 18,750, differential—neutrophils 66%, staffs 10%, lymphocytes 13%, monocytes 8%, eosinophils 2%, basophils 1%. Blood chemistry, April 14: fasting blood sugar 92 mg. %, alkaline phosphatase 29 K.A. units, total protein 4.7 g. %, albumin 2.5 g. %, globulin 2.2 g. %, thymol turbidity 9 units, flocculation 4+, nonprotein nitrogen 39 mg. %.

Autopsy findings.—The body was very jaundiced, and many petechiæ were noted on the serous membranes. The liver weighed 925 g. and had a grey external surface, with yellow mottling. The cut surface showed interspersed hæmorrhagic and yellow areas. Microscopically (see Fig. 1), necrosis was the predominant feature. The liver tissue was replaced by finely granular eosinophilic debris, sprinkled with particles of bile pigment, lymphocytes, and monocytes. In some places, shadowy outlines of hepatic cells were discernible. Some portal triads were the only viable remnants of liver tissue present.

Diagnosis—acute viral hepatitis.

Infant.

Baby S.H. was well at birth except for slight prematurity (see above). There was no jaundice or hepatomegaly. Immediately after delivery she was isolated from her mother, and given 2 ml. of gamma globulin* intramuscularly, as a prophylaxis against hepatitis. She remained well until the age of 2½ months, when she was admitted to the Vancouver General Hospital with complaints of anorexia, fever, dark urine, and blood-stained regurgitation of three days' duration. Her weight was then 3,800 g., and her temperature 103.2° F. Faint jaundice was noted, and the liver was tender and palpable 3 cm. below the costal margin. The spleen was not en-

*Immune Serum Globulin, Lederle. There has never been any suspicion of this material's being icterogenic.

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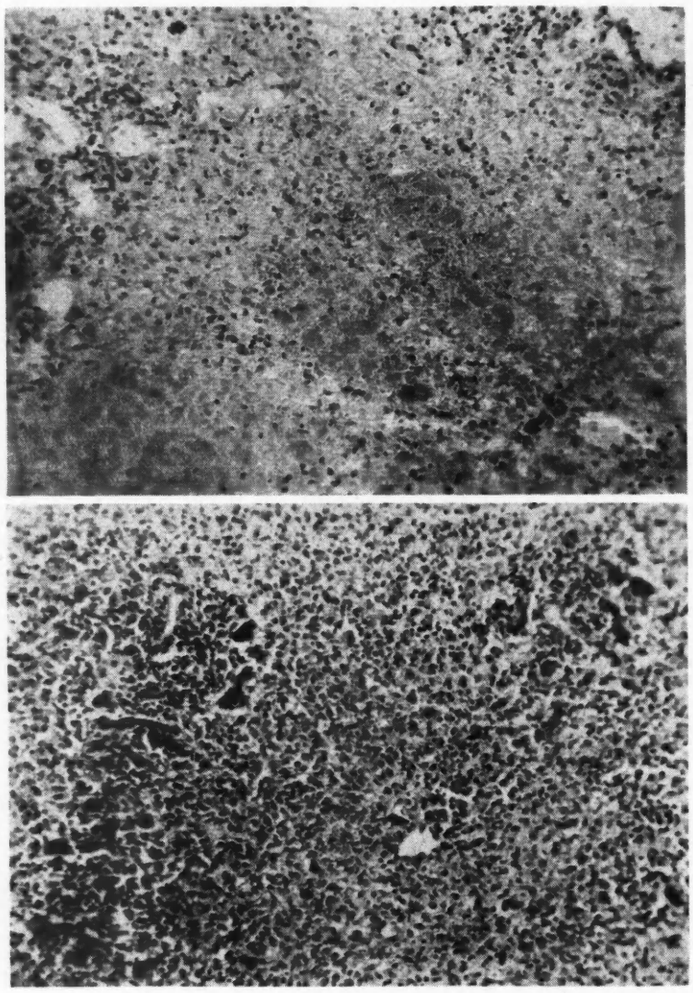

Fig. 1. (top).—Case 1, mother. The almost complete destruction of the liver parenchyma is shown with only a few shadowy outlines of hepatic cells remaining. The portal areas in the two upper corners have been spared. A central vein is present in the lower right-hand corner. H. & E. × 110. **Fig. 2.**—Case 1, infant. The picture here is similar to that seen in the mother, although the destruction is not as complete. A central vein is shown near the middle of the photograph, with portal areas at the periphery. H. & E. × 110.

larged. Treatment was instituted with oral and intravenous fluids, and chloramphenicol. The jaundice deepened rapidly, coffee-grounds vomitus was observed, and the baby finally became unconscious and died five days after admission.

Laboratory findings.—Urine, June 23: protein 2+, bile pigments, none. June 25: bile pigments 4+, urobilinogen 0.92 mg. %. Blood picture, June 22: hæmoglobin 69%, E.S.R. 6 mm./hr., white cells 12,100, differential—neutrophils 33%, staffs 1%, lymphocytes 65%, monocytes 1%. June 24: hæmoglobin 59%, reticulocytes 1.6%. Blood chemistry, June 23: serum bilirubin 3.5 mg. %, 5 min. direct bilirubin 1.9 mg. %. June 24: serum bilirubin 10 mg. %, thymol flocculation 1+, thymol turbidity 2 units. June 25: serum bilirubin 12.6 mg. %, direct 6.1 mg. %, alkaline phosphatase 60 K.A. units, total protein 5.2 g. %, albumin 3.8 g. %, globulin 1.4 g. %, thymol turbidity 6 units, flocculation 4+.

Autopsy findings.—The body was well-nourished and very jaundiced. Petechiæ were present on the skin and mucous membranes. The gross appearance of the liver was almost exactly like that of the mother's. It weighed 60 g., was flabby, and had dark red and bright yellow mottling over its external and cut surfaces. Microscopically, widespread necrosis was again evident (see Fig. 2). Nearly all the parenchymal cells were absent, and those remaining showed fatty degeneration. Much of the supporting reticulum of the liver was intact, and some blood sinusoids were present, coursing between the portal and central areas. Some duct proliferation was found in the portal triads, possibly resulting from dedifferentiating liver cells. The central veins and portal triads had preserved their relationship, and were intact. Some hæmopoietic foci were seen, but no giant cells were present.

Diagnosis—acute viral hepatitis.

DISCUSSION

The mother's hepatitis was probably of the homologous serum type. She had no contact with anyone suffering from infectious hepatitis, but had been given 40 injections of insulin with boiled needles about 100 days before the onset of her symptoms. This is the incubation period of homologous serum hepatitis. Drake and Ming have reported 70 cases of this disease in diabetics using boiled needles.[38] With carrier rates in the population of from 1%[39] to 6%[40] reported, it is quite possible that the infection was transmitted to her from another patient. No other cases occurred in the hospital, but Crease Clinic is a short-stay centre, and information is not available about the other patients after discharge.

The interval between birth and the onset of the baby's symptoms was 72 days, so that an antenatal infection would make the incubation period compatible with that of homologous serum hepatitis. Postnatal infection from the mother could not have occurred, because of immediate isolation, and the baby did not come in contact with other cases of hepatitis. The fact that the massive dose of 2 ml. of gamma globulin did not prevent hepatitis is strong evidence in favour of its being the homologous serum type (see above). This dose is equivalent to 0.4 ml./lb., and 0.01 to 0.02 ml./lb. is adequate in preventing infectious hepatitis.[41] The microscopic appearance of the baby's liver differed from that described by Craig and Landing in the presence of necrosis and the absence of giant cells. It is felt that this is due to the fulminating nature of the infection in this case, as opposed to the more subacute examples described by Craig and Landing. The case is also unusual in that the mother had clinical hepatitis during pregnancy. For the sake

of comparison, a case of the more usual type of neonatal hepatitis is presented below.

CASE 2—*Mother.*

Mrs. R.H. is a 20-year-old Indian, in good health. She has never been jaundiced, been exposed to anyone with hepatitis, or had an infection of blood or serum. She has two children—the patient, aged six months, and a boy, in good health, aged 21 months. The pregnancy and delivery of the patient were normal. At present she is well-nourished, and not jaundiced. She consented to have blood taken for the liver function tests reported below.

Laboratory findings.—Kahn, January 15, 1955—negative. Liver function tests, October 26, 1955: serum bilirubin 0.2 mg. %, alkaline phosphatase 7 K.A. units, total protein 7.3 g. %, albumin 4.6 g. %, globulin 2.7 g. %, thymol turbidity 4 units, flocculation 1+.

Infant.

Baby R.H., a female, had a normal delivery on May 20, 1955. She weighed 3,700 g., and had no jaundice or hepatomegaly. Two weeks later, dark urine which stained the diapers was noted. At four weeks of age, jaundice and pale stools became evident, and the baby was admitted to the Vancouver General Hospital one week later, weighing 3,600 g. Her nutritional state was fair, and marked jaundice was present. The liver was palpable 2.5 cm. below the costal margin, and the tip of the spleen was palpable. The baby stayed in hospital 13 days, during which time her condition did not change, except for a gain in weight of 500 g. The clinical impression was probable atresia of the bile ducts, and the baby was discharged on July 9, to be re-assessed later.

Laboratory findings.—Urine: urobilinogen from 0.26 to 0.37 mg. %. Blood picture, June 27: hæmoglobin 97%, white cells 10,200, differential normal. Serology: V.D.R.L. test negative. Blood group investigation: mother, group A, Rh positive, no antibodies present; baby, group O, Rh positive, Coombs test negative. Fæces: urobilinogen varied from 3 to 15.5 mg. %. Blood chemistry, June 27: serum bilirubin 7.6 mg. %, 5 min. direct bilirubin 5.2 mg. %, alkaline phosphatase 29 K.A. units, thymol turbidity 1 unit, flocculation negative. July 4: serum bilirubin 9.5 mg. %, direct 4.9 mg. %. Cortisone, 5 mg. t.i.d., p.c., was given from July 1 to July 4, but was ineffective in lowering the serum bilirubin.

The patient was readmitted on July 26, 1955, with the complaint of deepening jaundice and pale stools. She weighed 4,900 g., was in fair nutritional state, and was deeply jaundiced. The liver was palpable 2 cm. below the costal margin, and the tip of the spleen was palpable. On August 1, the baby was seen by the surgeon who noted that the jaundice was not as deep as he had expected, nor were the stools as pale as they should have been if complete biliary obstruction were present.

Laboratory findings—Fæces: urobilinogen from 4.1 to 29.5 mg. %. Blood chemistry, July 28: serum bilirubin 14.2 mg. %, direct 8.5 mg. %, total proteins 6.1 g. %, albumin 4.7 g. %, globulin 1.4 g. %, thymol turbidity 1 unit, flocculation negative. August 1: serum bilirubin 11.9 mg. %. August 9: serum bilirubin 12.5 mg. %. August 24: serum bilirubin 8.4 mg. %.

Because biliary duct atresia could not be definitely ruled out, laparotomy was performed on August 25. The liver was green, enlarged, and soft. No abnormality was found in the biliary ducts, and an operative cholangiogram showed that no obstruction was present. Bile was present in the gallbladder, and the spleen was not enlarged. The baby did well postoperatively, her bilirubin level remaining around 7 mg. %, and she was discharged September 10. Liver function tests were done on November 30, and results were all normal. When last seen on January 1, 1956, she was eating and gaining weight well, was not jaundiced, and had no ascites or hæmatemesis. Her liver was still palpable 2 cm. below the costal margin, however.

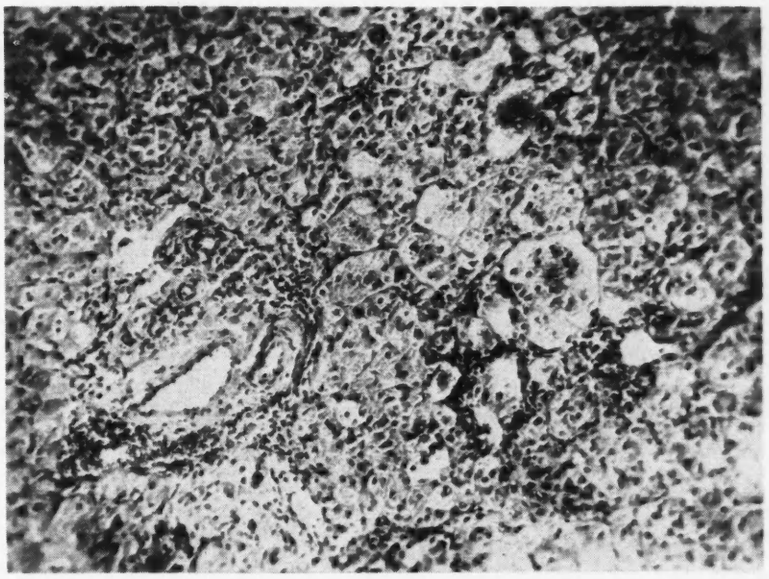

Fig. 3.—Case 2, infant. This is an example of typical neonatal hepatitis demonstrating the strikingly large balloon and multinucleated giant cells. A portal area is shown on the left, and a central vein on the right, illustrating the preservation of lobular architecture which was evident throughout the section. H. & E. × 110.

Surgical pathology.—Grossly, the liver biopsy tissue in the fixed state was firm and green. Microscopically (see Fig. 3), the radial pattern of the liver cell cords was grossly disturbed by severe degenerative changes in the cells. Many of them were ballooned, and giant cells with as many as 20 centrally placed nuclei were present. Some bile pigment was evident in the parenchymal and Kupffer cells, and a few hæmopoietic foci were seen. Very slight portal fibrosis was present, together with a portal infiltrate of neutrophils, lymphocytes, and eosinophils. The relationship of the central veins and portal triads was preserved, and very little actual necrosis was found.

Diagnosis—neonatal hepatitis.

DISCUSSION

The mother, as is usually the case, showed no clinical manifestations of hepatitis. Her liver function tests were abnormal, however, to a degree similar to that found in carriers of homologous serum hepatitis.[34] The baby's clinical history is typical in its resemblance to biliary duct atresia. The failure of cortisone to lower the serum bilirubin is interesting. Nevertheless, the bilirubin level did fluctuate somewhat preoperatively, which is not typical of duct atresia. The histology is the same as that described by Craig and Landing in their cases of neonatal hepatitis.

A search of the records since 1948 has revealed four other fatal cases, all proved at autopsy, and six non-fatal cases, making a total of 12. One of

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the former was a twin, and his sibling was unaffected. During the same period, four cases of biliary duct atresia were seen, indicating that neonatal hepatitis is a relatively much more common cause of prolonged neonatal jaundice at the Vancouver General Hospital than in other reported series.

It is interesting to note that one case of homologous serum hepatitis occurring three months after a blood transfusion was found in a woman who, after recovery, became pregnant on two occasions. Each time she delivered a premature baby which passed through infancy without developing clinical hepatitis. This shows that, if a mother has homologous serum hepatitis before becoming pregnant, the subsequent offspring are not necessarily infected.

SUMMARY

In reported series, from one-quarter to one-third of cases of apparent congenital biliary duct atresia are due to viral hepatitis. Available evidence indicates that this is due to homologous serum hepatitis virus infection acquired transplacentally from mothers who are asymptomatic carriers. Differentiation from duct atresia is important, because the mortality is very much higher after laparotomy. The clinical state, repeated serum bilirubin determinations with test doses of cortisone, and the zinc sulphate turbidity test are helpful in the differential diagnosis.

A case of apparent transplacental transfer of homologous serum hepatitis is reported in which the mother had acute hepatitis during pregnancy. Only one such case has been previously reported. Eleven other cases of neonatal hepatitis are mentioned.

My thanks are due to Dr. L. A. Patterson, Dr. C. J. Treffry, and Dr. J. W. Whitelaw, for permission to report their cases and for follow-up information about them, and to Dr. C. L. Aszkanaszy, Dr. H. E. Taylor, and Dr. W. B. Leach for help and advice in the preparation of this paper.

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APPENDICITIS IN INFANCY*

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A CASE OF appendicitis with periappendiceal abscess in a two-month-old infant stimulated a review of the literature on appendicitis during infancy, defined as the first year of life.

Textbooks of pædiatrics, pædiatric pathology, and pædiatric surgery state that appendicitis during the first year of life is extremely rare. No detailed description of the disease in infancy was found in any of those consulted. We were therefore astonished to find a very extensive review of this subject by Abt in 1917.[1] He collected 37 cases, 30 of which occurred before the age of three months. The pattern of the disease was well established then, and nothing new has been added since. The typical picture of an acute abdomen is rarely seen in infants with appendicitis. All the children, however, have diarrhœa and vomiting. As a rule the disease is diagnosed at autopsy. Very baffling is the

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description of four cases of prenatal appendicitis in the world literature, three of which were established beyond any doubt.[2-5]

Cases have been reported since Abt's review was published, and another review was published by Etherington-Wilson in 1944.[6] He collected 15 cases in infants less than 4 weeks old (the prenatal ones included) and 32 in infants between 4 weeks and 32 weeks of age. Twenty-three of these were found in males. In six cases the inflamed appendix was in a congenital hernial sac; the diagnosis is more easily established in such cases, and these infants are more apt to be surgically explored, therefore the prognosis is much better.

A combination of infection and obstruction is the probable etiological factor involved, although the funnel-shaped appendix of an infant does not easily become obstructed. It is, however, possible to visualize partial incarceration in a hernial sac or obstruction of the base of the appendix by the hernial ring. In numerous fatal cases of infantile appendicitis, fæcaliths were found in the lumen. Most patients, when explored, showed either abscess formation or generalized peritonitis and it was not possible to identify the obstructive mechanism.

Our case is not unique as we at first supposed; rather in many ways it is a typical example of infantile appendicitis. This male infant was delivered without complications at term in a country hospital. The weight gain was poor and the infant did not do well. Cyanosis was constantly present, but there was no heart murmur. The infant was admitted to the General Hospital in Edmonton four days before death. He vomited everything he took and had marked diarrhœa. The abdomen was markedly distended but soft. There was no clinical evidence of peritonitis. There were signs and symptoms of bilateral bronchopneumonia. The child was treated with intravenous fluids, and numerous antibiotics were tried without success. Death occurred three days after admission.

Autopsy revealed a malnourished infant with no external malformations, measuring 47 cm. from crown to heel and weighing 2,600 g. There was bilateral bronchopneumonia. The heart was enlarged and showed a widely patent foramen ovale, with absence of the septum secundum (Fig. 1). The bowel was covered with thin membranes of flaky fibrinous exudate (Fig. 2). A well-localized abscess was present in the periappendiceal region, measuring 3 cm. in diameter and containing about 6 c.c. of creamy yellow pus. *Staphylococcus aureus hæmolyticus* was cultured from the pus. Histological examination of tissue from the abscess area showed necrotic remnants of the appendix. No obstructive element could be identified. The wall of the abscess was diffusely infiltrated with neutrophils and many eosinophils.

DISCUSSION

Potter, in her *Textbook of Pediatric Pathology*, describes two similar cases of combined congenital heart disease and appendicitis in infants.

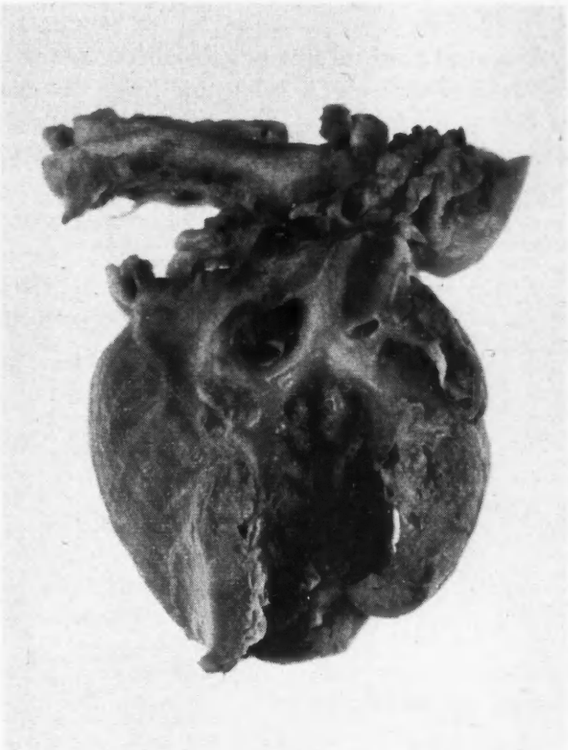

Fig. 1.—Heart showing patency of foramen ovale.

We were unable to find any other mention of this combination of diseases. This is the only unusual feature of this case.

Fig. 2.—Abdominal organs showing fibrinopurulent exudate on visceral peritoneum and applicator in open appendiceal orifice of cæcum.

SUMMARY

A typical case of appendicitis in an infant is reported. There was a coexisting large patency of the foramen ovale. Appendicitis in infancy is rare, but excellent reviews of the subject have been published.

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ACUTE BENIGN PERICARDITIS

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BECAUSE OF THE relative rarity of cases of acute benign pericarditis (A.B.P.) and its clinical similarity to coronary occlusion, we feel justified in publishing two new cases, including a short study of the syndrome.

According to McGuire *et al.*,[11] acute pericarditis can be classified as follows:

1. Acute non-specific pericarditis.
2. Tuberculous pericarditis.
3. Rheumatic pericarditis.
4. Uræmic pericarditis.
5. Pericarditis secondary to myocardial infarction.
6. Pyogenic pericarditis.
7. Traumatic pericarditis.
8. Pericarditis due to neoplasm.
9. Other rare forms of pericarditis.

ETIOLOGY AND PATHOGENESIS

The causative organism has yet to be isolated, and the mode of production is also unknown.

Acute benign pericarditis often appears two to three weeks after an upper respiratory infection, or after a period of mild, non-specific general malaise.[4, 5, 9] In other cases, the syndrome follows unusual physical exertion or emotional tension, or exposure to cold.[4] Some authors deny the relationship between A.B.P. and respiratory infections or "état grippal".[12] It is nevertheless considered by most as an infectious but non-specific entity.

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SYMPTOMS AND SIGNS

Pain or distress is felt in the mid-chest, substernal or precordial area, neck, left shoulder, left or right anterior chest.[2, 4, 9] There is also episodic thoracic pain, more or less distressing, sometimes constrictive in character, unrelated to effort but influenced by respiration and certain movements, e.g. forward flexion of the trunk.[5, 12]

Dyspnœa, malaise, fever and cough are the most common accompanying complaints.[4, 9] Signs of circulatory collapse are said to be infrequent.[4] When listened for, an early pericardial friction rub is heard, more noticeably in forced expiration. In some instances pleuropericardial effusion is noted.[2, 4, 9]

Radiographs show an enlarged cardiac shadow, sometimes due to pericardial fluid, but according to some authors more frequently to cardiac dilatation as evidenced by lack of suppression of cardiac sounds, absence of signs of cardiac compression and persistence of normal voltage in the ECG.[2, 4] The pericardial fluid has a specific gravity of 1.019 to 1.023, and a total protein of 4.5 to 6.0 g. %. It is often hæmorrhagic and contains many cells, particularly lymphocytes, ranging from 80 to 95%.[8] Pleural fluid is said to be more or less identical with pericardial fluid.[5] There is early leukocytosis, up to 15,000,[13] and a high sedimentation rate but this is attributed by some to coexisting infection.[7]

ECG signs consist of early elevation of the S-T segment, soon followed by a rotation to the right of the mean T vector accompanied by a symmetrical aspect of the T wave. This rotation obviously produces an inversion of the T wave in left precordial leads, as well as in D_1, D_2 and aVL. This inversion is usually of a lesser degree than in myocardial ischæmia. There are definitely no Q waves as encountered in myocardial infarction.

DIFFERENTIAL DIAGNOSIS

Differentiation from other forms of pericarditis is easy. Special attention should perhaps be given to coccidioidomycosis; this should be suspected when no etiology is evident and in regions where the disease is prevalent.[10] A few cases of echinococcus disease of the left ventricle have been reported recently[3] where, in our opinion, some of the electrocardiographic patterns might be consistent with pericarditis.

The main difficulty is its differentiation from myocardial infarction. Although many symptoms may mimic those of coronary occlusion, it will be found that pain in infarction is almost never related to respiration, leukocytosis appears much later and there is no precordial friction rub. Moreover, repeated electrocardiograms will confirm the diagnosis.

CASE 1

A 55-year-old white woman was seen on March 1, 1953, for substernal pain, thoracic constriction, effort dyspnœa and orthopnœa, non-productive cough, moderate fever and palpitations. The white cell count was 8,250, and the erythrocyte sedimentation rate (E.S.R.) (Westergren) 73 mm. after one hour.

Physical examination revealed a grade I apical systolic murmur, slight pulmonary dullness, decreased respiration, and a pleural rub at the right pulmonary base. The chest film was consistent with bilateral pleural effusion.

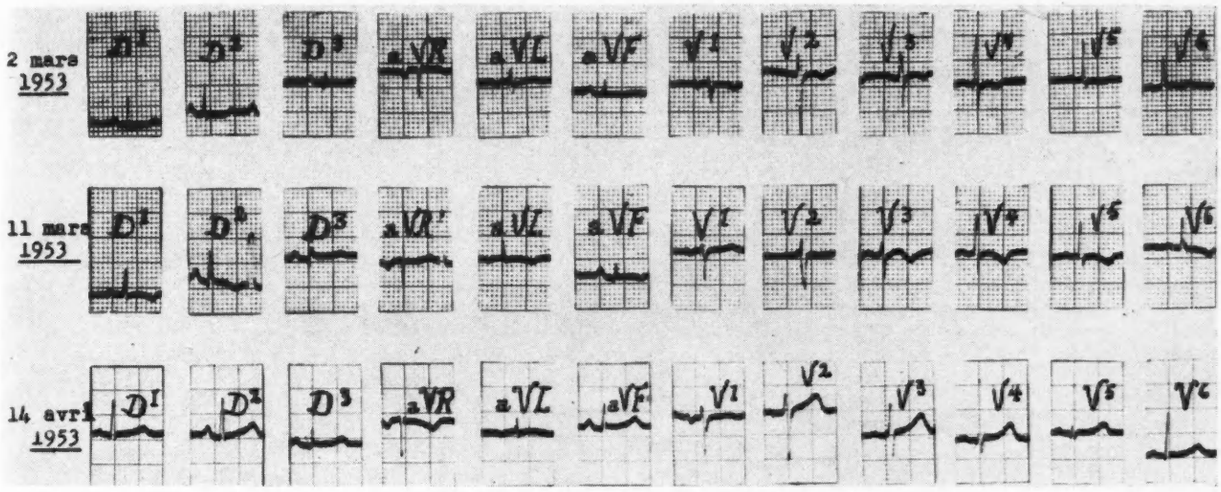

Fig. 1.—Electrocardiogram. Case 1.

PROGNOSIS

The prognosis is considered by all as excellent. It is very important to remember this whenever one is consulted by insurance companies or unemployment offices. The recurrent nature of A.B.P. should nevertheless be borne in mind, as cases are now reported in which the disease has recurred up to 19 times.[14] Very rarely pericardial calcifications have been found, but cardiac dynamics showed no evidence of impairment.[4] Few cases of adhesive pericarditis have been reported.[6]

TREATMENT

The efficacy of treatment, apart from general supportive measures, is questionable and improvement is thought to be rather coincidental, due to the well-known benign course of A.B.P. All available antibiotics have been tried; aureomycin is believed to be of some benefit. In our cases, the use of streptomycin apparently produced good results. Kursban and Iglaner, cited by McGuire,[11] reported an interesting case of A.B.P. where symptoms resisted all classical therapy but subsided with the use of ACTH. Anticoagulants should not be used since their use has been reported as fatal in cases of A.B.P.[8]

The first ECG (Fig. 1), taken shortly after admission, was interpreted as abnormal, non-specific but consistent with myocardial ischæmia and digitalis effect (in fact digitalis had been taken before hospitalization). On the 11th day of hospitalization, ECG changes were considered diagnostic of pericardial involvement. E.S.R. at that time was 30 mm. after one hour. On the fifth day of hospitalization, the temperature was normal.

The only treatment consisted of a daily intramuscular injection of streptomycin (1 g.). The patient was discharged free of symptoms after a 15-day stay in the hospital. One month after discharge, an ECG was reported as normal.

CASE 2

A white man, aged 47, was admitted on October 27, 1955, for constrictive thoracic pain, increased by respiration, and moderately severe dyspnœa which appeared about one month before admission, after prolonged mental and physical stress.

Physical examination disclosed a presystolic apical third sound and a pleural rub at the anterior and posterior pulmonary left base. White cell count was 12,500 and E.S.R. (Westergren) 62 mm. after one hour.

During his stay in the hospital, four electrocardiograms were taken (Figs. 2 and 3). The first tracing was interpreted as borderline and non-specific. The second showed the pattern of left latero-apical ischæmia. The third suggested pericardial disease in view of the S-T segment elevation and the absence of significant Q waves. The fourth was indicative of pericarditis. After four weeks, the E.S.R. was still 44 mm. The first chest radiograph showed an increased cardiac silhouette with a cardiothoracic ratio of 16.8/27.5 cm. After 11 days, this ratio had decreased to 14.2/27 cm.

The treatment consisted of a daily injection of streptomycin intramuscularly (1 g.) for 8 days, followed by 1 g. every other day. Initially the patient had been given intravenous heparin every three hours for a short period, because of a presumptive diagnosis of coronary in-

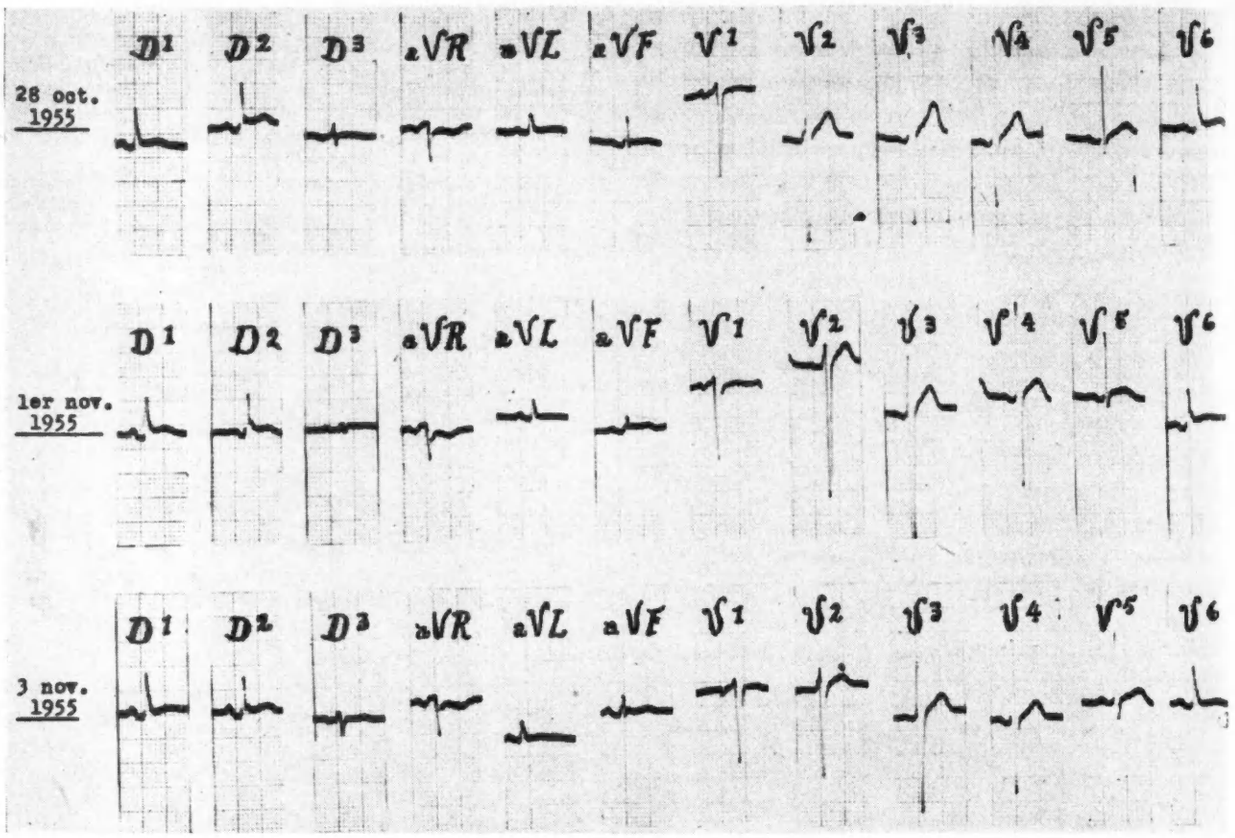

Fig. 2.—Electrocardiogram. Case 2.

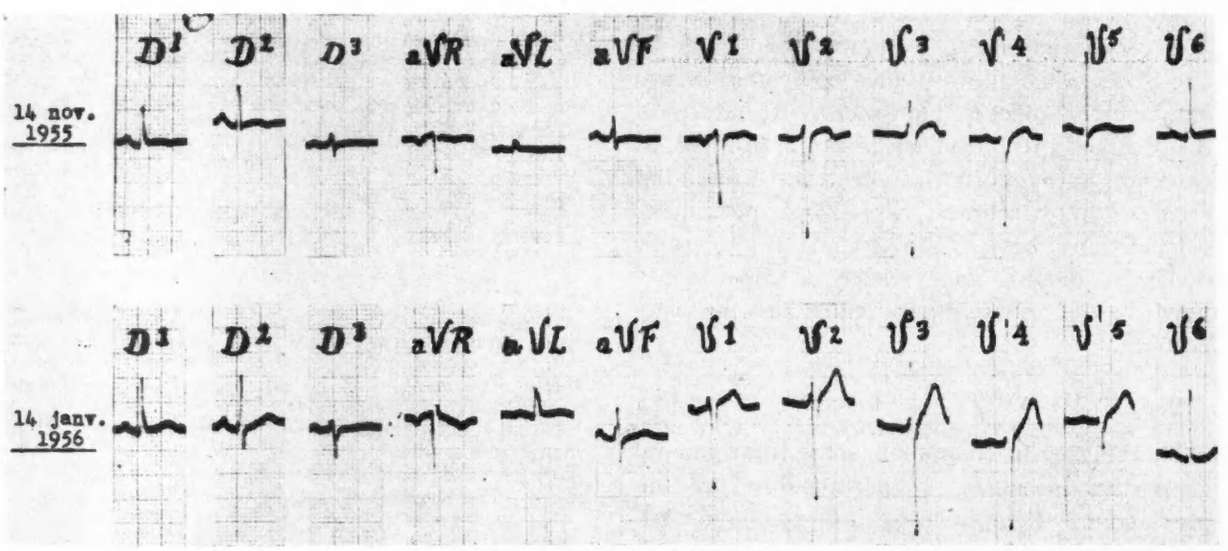

Fig. 3.—Electrocardiogram. Case 2.

sufficiency and impending myocardial infarction (heparin did no harm at all to this patient). The patient was much improved when he left the hospital on November 26. Forty-nine days after his discharge, an ECG was reported as normal.

SUMMARY

Two cases of typical acute benign pericarditis are reported, along with a brief survey of the disease.

Although results of treatment are generally reported to be rather questionable, streptomycin was used apparently with some benefit in our two cases.

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RÉSUMÉ

Le problème des péricardites aiguës bénignes, bien étudié depuis 1942, à la suite de Barnes et Burchell, est présenté brièvement.

Les symptômes cliniques peuvent facilement en imposer pour une thrombose coronarienne, mais les examens poussés et, surtout, l'étude évolutive des ECG finissent par signer définitivement le diagnostic.

Le traitement est généralement reconnu comme illusoire—sauf, peut-être l'ACTH—mais, dans nos deux cas présentés, il semble que la streptomycine ait été responsable des bons résultats obtenus.

CONGENITAL ANOMALIES OF THE DIGESTIVE TRACT: REPORT OF TWO CASES

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MAJOR ANOMALIES of the digestive tract, fortunately rather rare, are now being treated with much more success than before. The main reasons for this are better preoperative and postoperative care and far better anæsthesia. But there is also another reason: it is the application to the newborn of the sound principles of surgical technique used on the adult. The tissues of a baby are not different from those of an adult, except that they are more fragile. Gentleness in handling tissues is an essential of good surgical technique; there is no place for rough handling of tissues either in the adult or the child. Therefore, if a surgeon is used to working properly and gently, he will not have more difficulty in operating on young babies than on adults, and his results will be the same.

To illustrate what has been said above, we are reporting two cases of anomalies of the digestive tract, severe enough to kill if proper surgical treatment had not been given, with a favourable outcome in both cases; the first case was one of spherical duplication of the second portion of the duodenum, and the second of atresia of the small bowel.

DUODENAL DUPLICATION

A boy, 15 days old, was brought to l'Hôtel-Dieu Notre-Dame de Beauce on April 23, 1955, because of vomiting and loss of weight. When he arrived, we were told that he had been normal during the first 10 days of his life; then he began to vomit, and the vomitus, bile-stained, became more and more frequent and abundant. His weight was 6 lb., a loss of 1 lb. in five days.

There were signs of moderate dehydration, with a pale yellow skin coloration; in the epigastrium, we had the impression of feeling a rather hard mass, but satisfactory examination was impossible. Two days later, a barium film revealed great enlargement of the duodenal pattern with evidence of obstruction at the duodenum.

Blood and glucose solution were given intravenously after venous dissection, and operation was performed on April 27, 1955. The abdomen was entered through a right paramedian incision; exploration revealed, on the medial side of the duodenum at the union of its second and third portions, a cystic formation nearly as big as a tennis ball, and causing such compression that the adjacent duodenum was elongated and absolutely flat (Fig. 1). We tried to dissect this mass free, but relations between the duodenum and the cyst were so intimate that dissection was impossible without injuring the duodenal walls.

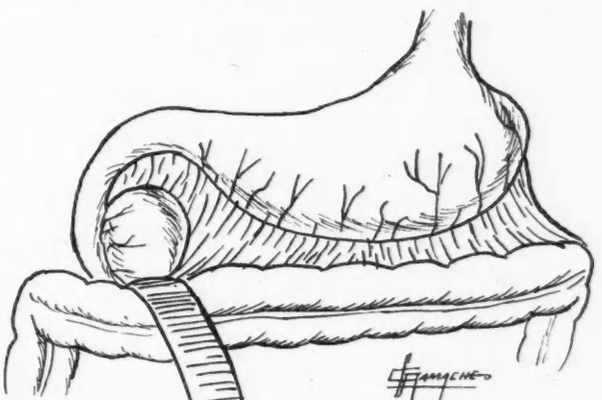

Fig. 1.—Spherical duplication of the duodenum, in the second and third portions; the duodenum was flatter than in the drawing.

After having clearly seen that the biliary and pancreatic ducts entered the duodenum about one inch (2.5 cm.) above the mass, we performed a resection of the duodenal segment along with the mass attached to it, and the operation was completed by a termino-terminal anastomosis between the proximal and distal parts of the duodenum.

A small tube was passed through the stomach into the duodenum for feeding and for suction; the abdomen was closed in three layers without drainage, and penicillin and streptomycin were left in the peritoneal cavity. During the operation, which lasted one hour and 50 minutes, the boy received 60 c.c. of blood and 100 c.c. of a mixture of glucose and saline solution.

For two days, he was hydrated parenterally and through the duodenal tube, which was then removed. At the beginning, there was some bile regurgitation, which decreased little by little. One week after operation, the child was considered out of danger.

The pathological report was as follows: "The cystic formation was filled with a clear yellow fluid and there

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was no communication between the duodenum and the cyst. The interior surface of the cyst is lined with a mucosa of duodenal type."

Seen in February 1956, the baby was doing well and his physical development was normal; he had absolutely no digestive trouble.

ILEAL ATRESIA

A male baby, born at 4.00 a.m. on August 5, 1955, was sent to hospital on August 6, at 8.00 p.m., for vomiting since birth. The baby was premature (7 months) and weighed 4 lb. 10 oz. At home, he had had only one bowel motion, by enema, and his physician noted that the stools were very small in quantity and rather hard.

During examination by the pædiatrician, he vomited two or three times, and vomitus contained bile; the abdomen was markedly distended and painful. The general condition was very poor; rectal temperature 98.3° F.

A radiograph taken immediately showed a large amount of gas in the stomach and upper small bowel with fluid levels; no gas was found in the colon. A diagnosis of obstruction of the distal part of the small bowel was made and immediate operation decided on.

Before the beginning of the operation, a cannula was inserted by cut down into an ankle vein of the right foot and glucose-saline solution was given; an inlying gastric tube was also introduced.

Incision was through the right rectus above and below the umbilicus; the following was the situation (shown in Fig. 2). The upper and lower left abdomen was filled with distended intestinal loops ending blindly near the right lobe of the liver and fixed to the anterior abdominal wall. About two inches (5 cm.) lower, but free in the peritoneal cavity (except for its mesentery), lay the distal end continuing with twisted loops of bowel to the cæcum; this intestinal portion was much like a spiral spring. No other anomaly was found.

To untwist these collapsed loops, it was necessary to cut the corresponding mesentery, thus necessitating an intestinal resection. Along with the terminal ileum, we had to remove the appendix, the cæcum and a small part of the ascending colon on account of poor vascularization; a termino-terminal anastomosis between the ascending colon and the opened proximal end of the ileum was accomplished in two layers. The colon was absolutely normal in appearance and on palpation.

The abdomen was closed in three layers without drainage; the operation, which lasted one hour and 45 minutes and during which 100 c.c. of whole blood was transfused, was well tolerated.

Parenteral fluids were continued during 36 hours, after which, the gastric tube being closed from time to time, the infant was given water orally. The gastric tube was finally removed 12 hours later, and feeding with milk and water began thereafter. The bowels had moved earlier in the day. During the following ten days, recovery was considered normal for such a case.

The length of bowel removed was 24 cm. and no pathological lesion was found on examination.

Then began a series of complications, both serious and benign. The first and the longest one was a tenacious diarrhœa which the pædiatrician (J.M.C.) had much difficulty in stopping. Twice during the first six weeks after the operation, we had to remove fragments of unabsorbed catgut stitches from the wound. In the seventh postoperative week, an abscess of the right thigh was opened and drained; the cause of this was probably contamination through erythematous lesions of the anal, genital and inguinal regions.

In the middle of November, everything seemed all right and the parents were told to take their child back home; they did not come and this proved fortunate because, one week later, the baby developed a bilateral bronchopneumonia. Again, the pædiatrician proved equal to the occasion and saved the child, who was left by his parents in hospital until January 15, 1956. On his departure, his weight was 8 lb. 3 oz.

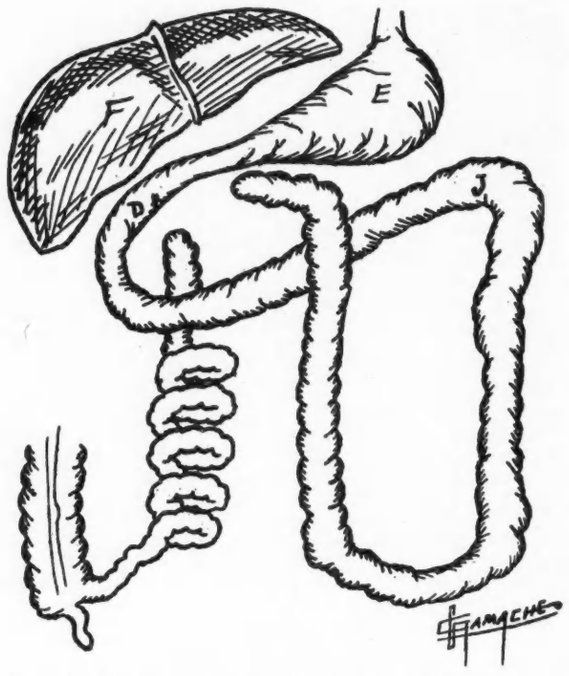

Fig. 2.—Ileal atresia; the distal end of the ileum was in front of the duodenum and not behind, as in the drawing.

COMMENTS

1. One of us (J.L.) has previously reported (*Canad. M. A. J.*, 70: 187, 1954) a case of congenital microcolon, with malrotation of the colon and multiple atresia of the small bowel. The existence of congenital microcolon was called in question by a critic who urged that if the colon was so small it was on account of the atresia higher up and the impossibility therefore of its dilation by meconium. We have proof in the case reported above that this idea was false. In the present case of ileal atresia, the colon was absolutely normal in appearance although nothing was passing through it from above; the colon was at least three times as big as the one in the case of congenital microcolon, and its consistency was softer than the other one.

2. In cases of duodenal duplication, we think that, when it is feasible, resection of the duplication along with the adjacent duodenum is superior to cutting a window between the cyst and adjacent duodenum, as advocated by Gardner and Hart.

With a window, there is always the danger of trapping duodenal contents in the pouch and also that the window may become too narrow or occluded and the cyst re-form.

HUMAN MYIASIS CAUSED BY THE GREENBOTTLE FLY, *PHÆNICIA SERICATA* (MEIGEN)

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BLOWFLIES ARE attracted primarily to decaying animal matter, and their larvæ show most preference for necrotic tissue. Larvæ are commonly found in unattended wounds or open sores in tropical and subtropical regions, particularly where the level of sanitation is low. In the livestock industry in subtropical regions, and less commonly in temperate regions, they are a distinct problem during dehorning and castration. The larvæ of *Phænicia sericata*, however, can invade healthy tissue. Sheep in subtropical regions such as Australia suffer from what is known as blowfly strike. Adult flies are attracted to and lay eggs on the soiled wool surrounding the excretory openings, whence the larvæ invade the unbroken skin and devour the tissue broken down by bacterial action.

A few cases of human infestation by this parasite occur in the European literature,[1] but apparently only one has been recorded on the North American continent. Ryckman and Halstead[2] reported a case of nasal myiasis in a woman 53 years of age. No details were given by these authors as to the probable method of entry of the invading larvæ.

A white woman of 26 was delivered of a normal female child weighing 6 lb. 3 oz. on June 27, 1955. The puerperium was uneventful and she breast-fed the baby.

On July 20, 1955, she stated that the baby had vomited all her feedings for the previous two days and she also noted that her milk was becoming watery and scant but that the breasts were not sore. Consequently the baby was put on a formula, upon which she promptly settled down.

The patient was seen again the following day complaining of painfully engorged breasts. To obtain some relief she had expressed them, and much to her horror she squeezed eight "worms" out of the left nipple and four out of the right. Fortunately she saved two of them. They were white grubs about 0.5 cm. long with tiny dark heads and were extremely active.

She was a slightly undernourished, rather exhausted-looking woman, looking older than her stated years, not too clean in her habits but filled with an intense loathing of her condition. Temperature was 98.2° F., pulse 77, full and regular, B.P. 110/70. The head and neck were normal, as were the heart and lungs. The small breasts were engorged and diffusely tender but no masses were palpable. There were no sores or ulceration about the nipples, which on expression yielded a greyish watery fluid. There were no lymph nodes palpable in the axillæ. The rest of the examination was negative.

The patient was hospitalized. Repeated breast pumping did not yield any more grubs, and the breasts were subsequently dried up with intramuscular Gynetone. She remained afebrile. White cell count was 7,200 and erythrocyte sedimentation rate 17 mm./hr. When she was discharged on July 25, 1955, the breasts were soft and no masses or tenderness could be elicited.

The grubs were placed at room temperature on fresh liver on July 21, and by July 25 had matured and pupated. They emerged as flies on August 7 and were identified by one of us (W.A.N.) as *Phænicia sericata* (Meigen), a common greenbottle fly of world-wide distribution.

The source of the infestation was puzzling, as the flies are not commonly attracted to the unbroken skin, particularly at the site here recorded. However, when we noted that the patient was not scrupulously clean in habit, we felt that the flies had probably been attracted to a brassiere soiled with rancid milk. Eggs were probably laid when the garment was laid aside at some time, and when it was again put on, the eggs hatched and the larvæ therefrom entered the breast.

SUMMARY

A case of blowfly infestation of a nursing human breast is presented, together with a possible mode of ingress.

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CONGENITAL INTRINSIC DUODENAL OBSTRUCTION

Duodenal obstruction in the early days of life is almost wholly due to stenosis or atresia, for annular pancreas and anomalies of intestinal rotation do not cause symptoms till later. Investigation of neonatal vomiting will make the diagnosis with ease. Plain radiographs show gastric distension in complete stenosis but Lipiodol by mouth may be necessary to demonstrate partial obstruction.

One case per 9,000 births is the incidence at the Indiana University Medical Center, and 32 cases were studied. Eight were premature and other malformations were frequent. No survival occurred before 1942, but since then 18 out of 21 patients have recovered. The commonest operative procedure was a duodeno-jejunostomy.—Thomas C. Moore, *Ann. Surg.*, 144: 159, 1956.

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Special Article

WHO CAN GO TO MEDICAL SCHOOL?

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IT IS GENERALLY ASSUMED that the only person who can send his son or daughter to medical school is one who lives in a large city and has the income of a professional man or business proprietor. Although those associated with medical education realize that this assumption is not valid, actual studies along these lines are seldom carried out.

The following survey was made at the University of Alberta, which is a typical state-supported university located in Edmonton, a city of approximately 226,000 people. The province of Alberta has a population of about 1,066,000, 55% of whom live in small towns or in the country. (These estimates are based on the information supplied by the *Canada Year Book*, 1955.)

The Faculty of Medicine of this university annually admits approximately 60 first-year students. These students pay somewhat lower fees than the average for Canadian medical schools, but even so each student must expect to spend about $1,375 per academic year for the essentials of tuition, books, room and board, and clothing. The cost of room and board is not the major factor for most Edmonton residents that it is for out-of-town students.

Almost all our students work during the summer to help finance their education, but even so they must depend upon other sources for aid in nearly every case. Therefore the income of the parents is generally considered to be a major factor in determining which students come to medical school.

Adequate records of the locations of the homes of our students have been kept for the past 12 years, and records of the parents' occupations for the last four. Thus we know the locations of the homes of 734 students, and the occupation of the parents of 285. In all cases the information is given as it was provided at the time the student first registered in the Faculty of Medicine.

It is often difficult to categorize a person's occupation satisfactorily, but in this study in doubtful cases an individual has been placed in the group that most nearly indicates his probable income. In all cases the occupation has been classified by the method used by the Department of Internal Revenue in its publications on taxation statistics, since this gives a closer estimate of income than does the method of classification used in the Federal census.

In a few cases students did not give the occupation of their parents, but the actual number of students enrolled is only slightly more than the 285 for whom information is available.

It is also difficult to ascertain the true home address of some of our students. By the time a student enters the Faculty of Medicine he has spent at least two academic years in Edmonton, and if he has no strong ties to his home town, or is married, he may list Edmonton as his home. As there does not appear to be any way to correct for this source of error, the figures are given directly as derived from the students' cards.

Students classified by the location of their homes

Table I shows the location of the homes of 734 medical students enrolled since 1944. Over the past 12 years 84.6% of our students have come from the province of Alberta. This figure has risen to 91% in the past four years, probably because complete medical courses have recently been inaugurated in the two neighbouring provinces, Saskatchewan and British Columbia.

TABLE I.

LOCATION OF THE HOMES OF MEDICAL STUDENTS

DATA FOR 734 STUDENTS ADMITTED TO THE FACULTY OF MEDICINE, UNIVERSITY OF ALBERTA, 1944 - 56 (AS GIVEN AT THE TIME OF ADMISSION)

Alberta		620 (84.6%)
Cities	386 (62.2%)	
Edmonton 266		
Other cities 120		
Town or rural	234 (37.8%)	
Outside Alberta		114 (15.4%)
Cities	56 (49.1%)	
Town or rural	58 (50.9%)	
Total		734 (100.0%)

Table I also shows that about 62% of the students come from cities, although the population of Alberta cities is approximately 480,000, or 45% of the over-all population of 1,066,000.* This high percentage of students coming from the cities is due entirely to the large number that give Edmonton as their home address. In fact, of the 620 students coming from Alberta, only 120 came from cities other than Edmonton. These represent 19% of our total enrolment, although their home cities have about 24% of the population of the province. Clearly city residence does not, per se, increase the probability that a person will become a medical student.

*Professor of Anatomy and Executive Secretary of the Faculty of Medicine, University of Alberta.

*Unless otherwise stated in the text, all estimates are based upon the Canada Year Book, 1955.

The total number of students who list Edmonton as their home is 266 (43%), although Edmonton has only 22% of the population of the province. The number of students from Edmonton is therefore almost double the expected number. This excessive proportion is probably due to three main factors: (1) The student who lives in Edmonton saves a great deal on room and board. Though some pay board to their parents and many more maintain their own homes, still a large percentage save $500 to $600 per year on this one item. (2) Many students who come originally from out-of-town points begin to feel, after two years in Edmonton as premedical students, that their homes are really in this city, and list it accordingly. (3) The location of the university in the potential student's home town is a psychological factor, in that he regards the university as "his" university, and does not have to leave home to attend.

In summary, although a somewhat higher percentage of our students come from urban than from rural centres, this higher percentage is entirely accounted for by the student population from Edmonton itself, and is probably due to a combination of economic and psychological factors.

Students classified by the occupation of their parents

Table II lists the occupations of the parents of our students, as determined for the last four classes to enter medicine and for the class accepted for admission in 1956.

Alberta is largely an agricultural province, 111,745 of a total labour force of 291,269 being farmers or employed in agricultural enterprises, according to the 1951 census. These represent 38% of the total labour force, whereas, as Table II shows, only 22.1% of our students come from farms. It is possible that a few other students have parents employed by farmers, but the number cannot be large. However, some parents are elevator agents, packinghouse workers, or are in other trades directly dependent upon agriculture and depend for their livelihood upon the farms in the surrounding district.

Almost one-third (30.2%) of our students are children of those classified as "employees", most of whom, as Table II shows, would not be expected to earn large incomes. According to the 1951 census, 30.8% of Alberta's labour force is in this bracket, and so it is fairly represented in our enrolment. A large percentage of the students in this category come from outside Edmonton and therefore can not economize on the item for room and board noted above.

A total of almost two-thirds (63.9%) of our students have parents classified as "farmer", "employee", and "pension income", or have deceased parents. Apparently many people are able to attend medical school even without a father in the upper-income brackets.

According to the 1951 census, those in Alberta who make up the "professional" and "business proprietor" classes comprise about 18% of the working population. It is difficult to compare these figures exactly with ours, which, as already noted, are based upon the income-tax classification; but 36% of the students in our medical school have fathers in these groups. It appears that persons in these categories are more likely to send their children to medical school than

TABLE II.

THE OCCUPATIONS OF THE PARENTS OF MEDICAL STUDENTS

DATA FOR 285 STUDENTS ADMITTED TO THE FACULTY OF MEDICINE, UNIVERSITY OF ALBERTA, 1952 - 56 (GROUPED ACCORDING TO DEPARTMENT OF NATIONAL REVENUE USAGE).

EMPLOYEES			86 (30.2%)
Business enterprises			63
Laborer	5	Gardener	1
Railwayman	5	Insurance agent	1
Carpenter	4	Janitor	1
Elevator agent	4	Machinery agent	1
Miner	4	Machinist	1
Mechanic	3	Plumber	1
Salesman	3	Power company	1
Barber	2	Public relations	1
Chef	2	Repairman	1
Draftsman	2	Sawmill operator	1
Foreman	2	Shipper	1
Highway construction	2	Shoemaker	1
Packinghouse worker	2	Shop instructor	1
Trucker	2	Station agent	1
Advertising	1	Steward	1
Baker	1	Stock superintendent	1
Bus agent	1	Sugar boiler	1
Decorator	1	Waiter	1
Dry cleaner	1	Welder	1
Government			11
Civil servant	8	M.L.A.	1
Agrologist	1	R.C.M.P.	1
Educational institutions			9
Teacher	7	School superintendent	2
BUSINESS PROPRIETOR			64 (22.4%)
Merchant	18	Transport owner	2
Manager	17	Coffee shop operator	1
Butcher	5	Editor	1
Contractor	3	Jeweller	1
Hotel or motel owner	3	Landlord	1
Wholesaler	3	Mine official	1
Garage owner	2	President fruit company	1
Pharmacist	2	Service station lessee	1
Theatre owner	2		
FARMER			63 (22.3%)
PROFESSIONAL			39 (13.7%)
Doctor	18	Accountant	2
Clergyman	6	Lawyer	2
Engineer	6	Chemist	1
Dentist	3	Geologist	1
PENSION INCOME (widows and retired)			29 (10.2%)
DECEASED			4 (1.4%)
Total			285 (100%)

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are persons chosen at random from the general population.

It is interesting to analyze this group further, for then one finds that of the "professional" category, almost one-half are doctors; in fact, 18 of the 285 students list the father's occupation as "doctor", which is 6.3% of the students, whereas doctors represent only about 0.3% of the total labour force of the province. It is apparently safe to say that young men still tend to follow the profession of their fathers, at least when this is the medical profession.

A noteworthy observation is that in this oil-rich province, only a very few parents of our students have any connection with the oil industry. The oil fields do, however, provide a proportion of the income earned by our students during the summer.

Those who are required to leave the Medical Faculty

In the category of those who have been required to withdraw from the Medical Faculty are placed only those who have permanently left the faculty for failure to achieve a satisfactory standard of work. There have been 28 of these in the past 12 years, divided almost equally between country and city students. When it is remembered that more of our students come from the cities (including Edmonton) than from the country, it appears that country students are slightly less likely to succeed than city ones, but the figures are too small to make any conclusion valid.

Among the 13 students who have been required to withdraw in the past four years and for whom we know the occupation of the father, it appears that all categories are represented and none unduly so.

One or two of our students have withdrawn permanently for personal reasons.

For financial reasons an occasional student, perhaps one in 100, withdraws for a time to improve his financial status by outside work, but he invariably returns after a year, or at the most two years, and completes his course. In our records there is no student who has had to withdraw permanently for purely financial reasons, although lack of money was a major factor in one case.

SUMMARY

In this study of the background of the students of the Faculty of Medicine, University of Alberta, it has been found that residence in the city in which the university is located increases one's chances of attending medical school, but that otherwise a city person is not more likely than a country one to become a doctor.

It has also been determined that about twice as many of our students come from the professional or business-proprietor classes as would be expected from the actual size of these categories in the general population. However, almost two-thirds of our students come from categories in which the income of the parent would be expected to be near or below the national average.

The failure rate appears to have little relation to the student's financial background, and probably little to the location of his home.

As a final word, the Medical Faculty of the University of Alberta is clearly of service to the province as a whole. While, as would be expected, a disproportionate number of its students come from Edmonton, it does not otherwise serve any one group at the expense of others; and any deserving student who has average financial support or even less is given an opportunity to become a doctor.

I am indebted to Prof. W. D. Gainer, Department of Political Economy, University of Alberta, for his assistance in the classification of the data.

Clinical and Laboratory Notes

THERAPEUTIC NOTE ON PSORIASIS*

FREDERICK KALZ, M.D.,† *Montreal*

GOECKERMAN DESCRIBED IN 1925 and again in 1930 his results with ultraviolet light treatment, using additional drugs such as quinine, rose bengal, eosin and porphyrin to sensitize the skin to light. Externally he applied an ointment containing 1% to 5% of coal tar and 5% of zinc oxide in petrolatum. He recommended slow tanning, tried to avoid severe erythemas, and reported satisfactory results; two to three weeks of therapy were required for mild cases, three to four weeks for severe cases.

A number of different light-sensitizing agents including sulfonamides and acridine dyes have been used subsequently, and several variations of the technique have been described during the last two decades.

We have never used any internal light sensitizers because of their inherent danger, but economic considerations made it desirable to find some method which would shorten the time

*Excerpt from a paper read at the tenth meeting of the Canadian Dermatological Association, Quebec, June 1956.

†From the Department of Medicine, section of Dermatology, Royal Victoria Hospital, Montreal.

required for hospitalization. The following technique which we have used exclusively during the last years appears to have given satisfactory results.

Two ointments have been used. The "strong ointment" contained 0.3% to 1% of Anthralin and 10% coal tar in petrolatum and was applied to the extensor surfaces of the extremities, the back, the buttocks and the hands and feet. The "mild ointment" contained 10% coal tar only, occasionally fortified by 0.1% of Anthralin, and was used on the flexor surfaces, the chest, abdomen and axillary folds. For the scalp a washable ointment base containing 3% salicylic acid and 5% liquor carbonis detergens was used. The ointments were applied at night, after a thorough scrubbing with soap, brush and water. They were removed with oil, and a lukewarm bath without scrubbing was allowed each morning before the ultraviolet therapy; the ointments were reapplied after therapy and again thoroughly washed off in the evening, using soap and a tough brush.

The purpose of the ultraviolet therapy is to produce each day a moderate erythema over the whole body, with special attention, however, to the involved areas. This is not easily done; overdosage results in a painful burn and treatment has to be discontinued, while under-dosage results in slow increase of light tolerance without the desired tissue reaction, and the results will be as slow as described by Goeckerman. The initial erythema dose can be determined by a test dose using a cardboard sheet with four openings through which the several test doses are applied. The intensity of the erythema can then be read after eight hours. A daily increase of 30% to 50% is usually suitable to reproduce the desired intensity; occasionally the same dose may be repeated if the reaction was too strong in some areas; or the dosage may be doubled if no suitable response has been elicited. The dosage increase is of course determined either by increasing the exposure time or by decreasing the distance, and much depends on the competency of the physiotherapist. It is necessary to use rather small and multiple fields in order to obtain an even reaction, and the radiation angle of 90° is essential for even exposure. Even the best physiotherapist may profit by daily consultation with the physician to determine the suitable dosage.

Two types of reaction may be observed in patients so treated. Less infiltrated guttate lesions and older "ripe" dry plaques melt away rapidly, the scales are easily removed by soap and water, and the clean-up is usually terminated after five daily exposures. More acute, exudative infiltrated patches do not peel off so easily. Little change is noticeable before the sixth exposure, when central healing begins to show. Thorough brushing and removal of all loose scales is essential at this point; the seventh exposure is usually followed by a more violent tissue reaction on the border of the lesion, which may result in marginal vesiculation. Pea-sized vesicles, sometimes painful, shoot up on the border of the psoriasis plaque, while the surrounding normal skin shows no reaction. This vesicular reaction usually terminates therapy. The patient may be discharged, and normal, somewhat hyperpigmented skin may be expected after the reaction has subsided.

Too intensive erythemas may be transformed, as a Koebner isomorphic effect, into new psoriasis lesions. This is particularly prone to occur in overtreated psoriatic erythodrodermas and in other very acute eruptions. Such cases are not suitable for this method, at this stage. Equally, patients who give a history of oversensitivity to sunlight should not be so treated.

Seventy-eight admissions for psoriasis were listed during the five-year period from 1949 to 1954 in my service. Three patients suffering from an acute febrile psoriatic erythroderma were not treated by this method. Apart from those three cases, no further selection was practised, and all patients admitted to my service were treated as outlined above. This series thus comprises 75 admissions, all cases of widespread and severe psoriasis. In 61 instances lesions cleared completely in eight days or less, and the patients were discharged within this period. In 13 cases a longer hospital stay was necessary (average of 13 days). These latter included five cases of subacute psoriatic erythroderma, and eight cases of the "inverted type", involving axillæ and submammary and genital regions. All patients were either completely free of psoriasis or had only some minor residual lesions on discharge. The average time of remission was seven months, probably the same time as with any other method. Many patients prefer this more aggressive method and a short stay in hospital to protracted and sometimes unsuccessful ambulatory treatment; a number of these patients report every year for their "yearly clean-up" as a matter of routine.

SUMMARY

Some modification of the psoriasis treatment described by Goeckerman are reported. This modification tends to shorten the duration of therapy to about one week in the average case. The flexor type of psoriasis requires an average treatment time of 13 days. The results of treatment in 75 cases are reported. The shortening of the treatment time is achieved by:

1. An increase in percentage of stimulating and light-sensitizing agents in the ointments used.

2. An increase in the intensity of the ultraviolet reactions.

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NATIONAL HEART FOUNDATION

It will be recalled that at an organizational meeting of the National Heart Foundation of Canada last June a Dominion Charter was received, a Constitution and By-laws were approved and a Board of Directors was appointed. The sequel to this was a meeting of the Board of Directors in C.M.A. House, Toronto, on Tuesday, October 30, at which the aims and objects of the Foundation were freely discussed and the means of implementing them considered. Two questions will arise in the mind of the reader at this stage. What exactly is this National Foundation going to do? What is its relationship going to be to similar provincial organizations?

The first question may be briefly answered by saying that the Foundation is primarily interested in research in cardiovascular diseases, and secondly in professional education in this specialty. Canadian research in cardiology is proceeding with increasing volume in a number of provinces, but there is now a need to take a look at the picture as a whole, to see which centres are best fitted to do research in particular parts of the field, to eliminate unnecessary overlap, and to co-ordinate the efforts of investigators. There are also in a number of centres investigators with ideas for research but no funds to carry the work out. The task of the National Heart Foundation will be to seek funds for these men, either from government or from voluntary sources, to employ all the modern aids in publicizing the need for such work, and to assist investigators across Canada in co-ordinating their efforts.

But research alone is useless unless the ordinary practitioner is shown how to apply its results. The Foundation will therefore support in each province the work of teams, each probably consisting of two experts in cardiology, who are prepared to visit outlying communities and assist the local practitioners in diagnosis and treatment of cardiovascular disease. As a step towards putting this program on a firm basis, the board has authorized the immediate appointment of a medically qualified full-time Executive Secretary. To keep down costs, the Canadian Medical Association has offered office space while the groundwork of the Foundation is being done.

At the recent meeting of the Board of Directors, at which the President, Dr. G. F. Strong of Vancouver, took the chair, representatives of the provincial heart foundations were present as board members. Each in turn told the meeting what was being done in his province. The most firmly established is of course the Ontario Heart Foundation, but Quebec, British Columbia and Saskatchewan have all formed similar organizations, while in Manitoba an association is in process of formation, and it is probable that Alberta and the Maritimes will follow suit. The relationship between the national body and the provincial ones has not been too narrowly defined so far, but there is plenty of precedent in Canada for the establishment of a Dominion-wide organization at some time after provincial organizations have got into their stride. It is likely that a pattern will develop in which the provincial organizations act as divisions of the national body, working in close liaison with it, raising funds in their respective provinces, and informing it of their various hopes and aspirations in the field of research, so that the National Heart Foundation can aid each province in employing its cardiological talents to the greatest advantage from the national viewpoint.

The National Heart Foundation has a strong Board and good officers. With the increasing emphasis on the importance of heart disease in Western civilization, it is clearly a body for which there is a growing need. We greet it warmly and wish it every success.

Editorial Comments

SURVIVORSHIP OF REPORTED CANCER CASES

Kraus and his colleagues have studied the five-year survivorship, by site, sex and age, after the alleged first symptom in 2,065 reported cancer cases in six northern counties of New York State. They calculated *adjusted survival* rates as the percentage the *observed* five-year survival rate in the patients forms of the five-year survival rate in the corresponding sex-age group in the general population—a readily assimilable and meaningful figure. The vagaries of small figures make some of the adjusted survival rates of the patients exceed the survival rates in the general population; while these excesses are few and, as pointed out by the authors, not "statistically significant", they serve to caution the reader against other possible chance variations in either direction in the data.

Of all cancers in the male, skin accounted for 16.4%, prostate 14.5%, bladder 4.6%, stomach 12%, leukæmia and aleukæmia 2.4%; of all in the female, breast accounted for 20%, uterus including cervix 19.6%, skin 8.6%, leukæmia and aleukæmia 2%. The *observed* five-year survival rate in the whole group was 27.7% and the *adjusted* survival rate, as described above, in each sex was about 33%. The relationship between age and survival was not consistent from site to site, and only in cervical and ovarian cancer were the differences between the rates in different age groups "statistically significant". Contrary to prevailing opinion, the survival rates in younger women with cancer of these two sites and of some other sites were higher than those in older women. "While part of this relationship appeared to be explained," the authors say, "by the tendency of younger cases to be diagnosed at an earlier stage than older cases, factors other than stage at diagnosis also appeared to be involved." Close search failed to reveal any greater inclusion of "false positives" in the younger ages. The adjusted five-year survival rates naturally varied greatly with site, being 90-100% in patients with skin cancer, 86% with lip cancer (males), 45.6% with breast cancer, 5-7% with stomach cancer and 0-5% with leukæmia. With the single exception of lip cancer in the male, the five-year survival rate in patients with "early local" lesions was consistently greater than in patients with cancer of other stages. This difference was "most striking for ovary, bladder, large intestine and rectum". The authors conclude that "Since these were sites with very low over-all survivorship it would appear that a great gain in survivorship would result, if a much higher proportion of cases in these sites could be diagnosed while still in the early local stage."

Even this guarded deduction, however, needs some further consideration; the suggested solution is not so simple as might be inferred. The authors do not indicate how diagnosis could be made in the "early local stage", and they make no mention of the fact, now well recognized and emphasized by Paterson,[2] in regard to breast cancer, that " 'early' is currently used as a measure of extent, not of time". So it is of cancers of other sites. Thus, a lesion that is confined to its original site is not necessarily one of short duration but the restriction to the original site is, to some degree, an indication of the type of cancer. Neither do the authors mention the fact that, in breast and cervical cancer at least, the lesions of shortest alleged duration have nearly as high a proportion extended beyond the original site as have those of longer duration. Nor do they mention that, as conclusively demonstrated for some sites such as skin, cervix and prostate, and in all probability applicable to all, a cellular architecture microscopically indicative of cancer does not necessarily indicate a lesion that would progress to a lethal termination. Thus, there are many problems to be investigated and solved before we can look confidently for a great gain through earlier treatment. The study does indicate for site, sex and age the extent of what is being treated as cancer and the five-year survival thereof in Upstate New York. But it is salutary to remember that what is treated varies with selection, and selection varies, to a varying degree, with both time and place, and variation in selection influences survival rates. Therefore, before these data, even if they were much larger, could serve reliably as a base-line for the precise measurement of changes in the incidence of "early local" cancer or in results achieved by new diagnostic, preventive or medical services, changes in selection would have to be eliminated.

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BIRTHMARKS

Vascular nævi are of common occurrence in infants, are of great concern to parents and are the subject of much therapeutic controversy. The natural parental desire for active treatment is backed by many authorities who advocate radiation therapy, care being taken to employ techniques precluding damage to radiation-sensitive structures such as the epiphyses or the ocular lens. There is also a large group of authorities who feel that active therapy is rarely required and that the great majority of strawberry marks and port wine stains will spontaneously disappear at an early age.

This therapeutic controversy is well aired in the journal *Radiology*, June 1956). The case for active treatment is ably presented in a compre-

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hensive report on 400 cases treated by x-ray radiation by Amdrup and Knudsen, in Denmark, with excellent results. In the same issue of the journal, Schulz, radiotherapist at the Massachusetts General Hospital, presents the case for a conservative "leave-it-to-nature" attitude with powerful statistics and much good common sense.

It is probable that radiation therapy will hasten the disappearance of infantile vascular nævi. It is certainly more than probable that the vast majority of these nævi will spontaneously disappear, usually by the age of two years. It would appear that radiation therapy is rarely necessary, and when it is employed method and dosage should be highly individualized.

NORMAN S. SKINNER

VIRAL KERATOCONJUNCTIVITIS

Advances in the study of virus diseases have been rapid in recent years. Ophthalmology has shared in this progress, and recently a small group of ophthalmologists, virologists and epidemiologists met in San Francisco to discuss viral keratoconjunctivitis.[1]

Trachoma remains the most serious viral cause of visual disability, on a world scale. Although investigation in this field is active, little progress has been achieved in elucidating the etiology. Snyder discussed some of the difficulties involved in the investigation of trachoma. Epidemic keratoconjunctivitis (E.K.C.) is a serious disease which has occurred in widespread epidemics, especially in large industrial concerns. In many outbreaks transmission of the disease has appeared to be mediated by ophthalmic clinics, sometimes associated with a particular instrument, especially the tonometer. Leopold described a hospital outbreak associated with the use of a particular giant ophthalmoscope. The characteristic feature of this disease is the appearance of severe subepithelial corneal opacities, which may persist for years. The appearance of these opacities, which develop as the acute conjunctivitis subsides, allows the diagnosis to be made in sporadic cases. The opacities are not, however, constant. In the Ford outbreak in Windsor in 1951[2] only 89 patients out of 549 examined had opacities. In other outbreaks the incidence has been higher. Studies in Japan,[3] reported to the meeting by Tanaka, in which human transmission experiments were performed, suggest that E.K.C. manifests itself quite differently in children and in adults. In adults, systemic symptoms are mild or absent and corneal opacities common. In children there is high fever, conjunctivitis, sore throat, otitis media and diarrhœa and vomiting; keratitis is very rare. The disease in children is similar to pharyngoconjunctival fever.

Evidence is accumulating that this disease is due to a member of the APC group of viruses now known as adenoviruses.[4] Jawetz *et al.*[5] isolated a virus, designated adenovirus type 8, from a sporadic case of E.K.C. in 1955. Since then according to Jawetz only two more isolations have been achieved, one from a patient with probable E.K.C. in Japan, and one from a child with severe conjunctivitis in Saudi Arabia. However, evidence for the causal role is quite strong. Thus Mitsui found that typical clinical E.K.C. developed in three out of five volunteers inoculated with the Jawetz strain which had had more than 14 passages in HeLa cells. Two volunteers did not develop opacities; one had severe conjunctivitis but no corneal opacities. The other volunteer had antibodies in the prechallenge serum and resisted multiple attempts at infection. Also Jawetz and his colleagues have tested sera from cases of E.K.C. and found a rise of antibody titre in the majority of patients with paired sera and high incidence (50-90%) of titres over 1:10 in convalescent sera, whereas this titre was attained in only 7-13% of control sera.

Earlier findings of a virus which would grow in mice are impossible to interpret, since the virus is not now available for testing. Serum from patients involved in the earlier epidemics could be tested for antibodies to type 8 adenovirus. However, Jawetz finds the neutralization test laborious and of low sensitivity. Thus the titres attained in convalescence are relatively low and decline in a few years to undetectable levels by the present technique. He has therefore limited his enquiries in previous epidemics to those more recent than 1951.

Pharyngoconjunctival fever was also discussed. This is an epidemic disease, especially in children, but it also occurs sporadically, particularly in adults. Adenovirus type 3 has been implicated in severe epidemics in the Washington area.[6] Types 3 and 4 virus cause the syndrome after virus is swabbed on to the conjunctiva.[7] Type 7 virus or a variant known as 7′ has been isolated from patients involved in the Toronto epidemic described by Ormsby and Aitchison.[8] The clinical features in children are of conjunctivitis with sore throat, both of which are often unilateral at first and accompanied by fever. Some cases present only with conjunctivitis. During 1955 adenovirus types 3 and 7 were isolated at the Hospital for Siek Children, Toronto, from adults and children with conjunctivitis. One isolation each of types 2 and 9 was made from such cases. Systemic manifestations in adults are less severe. Considerable discussion concerned the occurrence of corneal opacities in cases yielding types 3 and 7 virus. Ormsby has seen opacities, clinically similar to those of E.K.C., though rather less severe as a rule both in intensity and duration, in such patients. Other workers have failed to find these

opacities in their cases. Fowle presented the results of an antigenic analysis of type 3 strains, isolated in Toronto, from mild and severe cases, but could detect no differences. It is clear that corneal opacities do occur in infection with adenovirus types 3 and 7, but they are probably rarer than in infection with type 8 virus.

The spread of pharyngoconjunctival fever has frequently appeared to be mediated by swimming pools.[6, 8] Huebner argued that the main role of the swimming pool was in allowing virus to breach the conjunctiva, either by washing away viral inhibitors or by actual damage to the cells. The role of eye clinics in the spread of E.K.C. was similarly thought to be due to conjunctival cell damage. This contention was based on the fact that in experimental infection swabbing adenovirus on the conjunctiva was far more effective than dropping virus into the eye or instilling it into the nose. The isolation of adenovirus from swimming pool water has not been reported, but perhaps the technique of sampling the surface film which contains the respiratory secretions of the bathers, recently described by Amies,[9] may enable this to be done. Huebner also noted that in the recent successful trials of an adenovirus vaccine in naval recruits penicillin prophylaxis seemed to lower the total incidence of respiratory infection and not only that due to *Streptococcus pyogenes*.[10] This suggests that bacterial infection may pave the way for viral infection. Virus is required to initiate infection. Korns[11] found in the Syracuse epidemic of E.K.C. in 1942 that one group of people escaped infection although exposed to the same degree of eye trauma. The simplest explanation was that the eye clinic they attended was free from viral infection.

The trials of adenovirus vaccine[10, 12] currently under way in American service recruits are of great interest for the possible control of the eye manifestation of these diseases. Laboratory studies have shown that antibody protects against conjunctival challenge with adenovirus.[13] The vaccine trials have shown that adenovirus vaccines containing types 3, 4 and 7[10] and types 4 and 7[12] stimulate antibodies. The incidence of clinical respiratory disease in vaccinated recruits was reduced at a time when adenovirus type 4 was prevalent in the populations. These vaccines have been made by growing the adenoviruses in monkey kidney tissue cultures and inactivating them with formalin. This means that the considerable production capacity and technical skill developed by the manufacturers for poliomyelitis vaccine can be utilized for these new vaccines. Indeed, the vaccine used in the naval trial was commercially prepared.[10]

Finally herpetic keratitis was discussed. This virus shares with adenoviruses the capacity for persisting in the body despite the presence of circulating antibodies. Adenoviruses types 1, 2 and 5 are present in a high proportion of human adenoids and tonsils. There is as yet, however, no clinical manifestation associated with their recrudescence *in vivo* to parallel the fever blisters of herpes simplex. Herpes simplex virus has not been recovered from tissues subject to recurrent herpes. Grinding the tissues and inoculating extracts into animals or tissue cultures has proved unsuccessful. Success may be achieved by the technique developed for the unmasking of adenoviruses, namely propagating the tissues for long periods *in vitro*.[14] So far no success has been reported with this method, but persistence is indicated since the recently isolated salivary gland virus took four months to manifest itself by this technique.[15, 16] Several speakers had had success in curing recurrent herpes by excision of the affected tissue. It was agreed that large corneal grafts were the treatment of choice for recurrent herpetic keratitis.

A.J.B.

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PRIMARY ALDOSTERONISM

In 1955 Conn (*J. Lab. & Clin. Med.*, 45: 6 and 661) first drew attention to the possibility of a primary aldosteronism, in which increased aldosterone production by the adrenals was the cause of the clinical picture. Several other authors have also reported cases of this condition in which the leading symptoms are muscle weakness, tetany, polyuria, polydipsia and hypertension. The potassium level in the serum is greatly lowered and the sodium level is raised. The urine contains an excess of potassium and there is a negative potassium balance. A similar syndrome has been described by other authors as "potassium losing nephritis". When such patients have been operated upon, an adenoma or carcinoma of the adrenal cortex has usually been found, but van Buchem of Holland and his colleagues (*Nederl. tijdschr. geneesk.*, 100: 1836, 1956) report a similar case in which the only pathological finding was hyperplasia of the adrenal cortex, particularly of the zona fasciculata and to a lesser extent of the zona glomerulosa. In van

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Buchem's case the presenting symptoms—slight in themselves—were polyuria, polydipsia and headache on exertion. Blood pressure was high, but there was no muscle paralysis. The patient, a boy of 17, showed signs of retarded sexual development. Serum findings were as in other cases, and the aldosterone excretion in the urine in 24 hours was very high—35 gamma (normal 0.1-8 gamma). At operation the right adrenal was removed together with nine-tenths of the left. After operation, cortisone was given (1.25 mg. a day); blood pressure returned to normal and other symptoms disappeared.

Van Buchem comments on the absence of muscle weakness, although faradic stimulation gave a myasthenic reaction before operation; this reaction was less marked after adrenalectomy. He suggests that both the zona fasciculata and the zona glomerulosa produce aldosterone.

RENAL DAMAGE FROM POTASSIUM DEPLETION

It is well known that certain renal tubular diseases may cause a depletion of body potassium, but it is not yet generally appreciated that potassium depletion may itself damage the renal tubules. There is, however, increasing evidence that this is so, and a recent paper by Dr. Relman and Dr. Schwartz of Boston emphasizes that this condition is probably more common than most of us realize.[1] Following a previous report on two cases,[2] the authors have now made careful studies on five other patients and have analyzed eight cases from the literature. All their own cases had developed potassium deficiency as a result of chronic diarrhœa, and had the characteristic symptoms of muscle weakness and aching pains. In addition, some patients had noted a marked polyuria and a tendency to peripheral œdema. Routine urinalysis, apart from showing a low specific gravity, gave little indication of renal disease although occasionally slight albuminuria and cylindruria were noted. Renal function tests, however, revealed a fairly constant pattern in all cases. Tubular function, as tested by urinary concentration under vasopressin stimulation and phenol red excretion, was markedly diminished, while clearance tests showed that glomerular filtration was only moderately impaired. The non-protein-nitrogen levels in the blood were not significantly raised. Renal biopsy was performed in three of the authors' cases prior to treatment and showed a characteristic picture of abundant large clear vacuoles in the cells of the tubular epithelium in one case, and definite but non-specific degenerative lesions in the other two. After treatment with potassium chloride, biopsy was repeated and showed complete restoration of the normal cellular architecture. Microscopic changes have previously been described in the renal tubular epithelium of animals with experimentally induced potassium deficiency states, and there are also accounts in the literature of biopsy and autopsy findings in clinical cases where potassium depletion either had been established or could be inferred. From a survey of these reports it would seem that the vacuolation seen in the tubular epithelial cells is the typical lesion produced by lack of potassium. The damage is apparently completely reversible, at least in the early stages, but the healing process may be gradual and in two of the authors' cases normal renal function was not restored until 6 to 12 weeks after correction of the potassium imbalance.

The manifestations of this nephropathy are neither particularly striking nor specific, which may explain why the relationship between potassium depletion and renal damage has not been more widely recognized. It occurs in clinical states which are often complicated by many other factors, including established renal disease, and here there is a danger that the increased impairment resulting from the electrolyte imbalance may be misinterpreted as a progression of the underlying kidney disorder. The diagnostic criteria appear to be the demonstration of renal dysfunction associated with potassium depletion and improvement following restoration of potassium balance. Confirmation is provided by the typical histological appearance in biopsy material.

There is no evidence so far that the tubular damage caused by the potassium depletion can itself result in urinary "wasting" of potassium and the establishment of a vicious circle, but it is not yet known whether irreversible and progressive renal disease may eventually result, and further observations on this and other points are necessary. The present authors have established the condition as a clinical and pathological entity, and in view of the wide variety of clinical states in which it may occur and with the increased awareness of clinicians, it is probable that further observations will soon be forthcoming.

R.L.

REFERENCES

1. RELMAN, A. S. AND SCHWARTZ, W. B.: *New England J. Med.*, **255**: 195, 1956.
2. SCHWARTZ, W. B. AND RELMAN, A. S.: *J. Clin. Invest.*, **32**: 258, 1953.

ERRATUM

Dans le résumé de l'article intitulé "The Use of Mandelamine in 100 Unselected Cases of Various Urinary Tract Infections" de Bourque et Joyal (75: 634, 1956) veuillez lire au début des paragraphes 1, 2 et 4 la phrase "mandélate de methamine" au lieu de "mandélate d'ammonium".

Medical News in brief

H DISEASE

Members of the staff of the Middlesex Hospital, London, (*Lancet*, 2: 421, 1956) describe four cases of a new hereditary syndrome which they call H disease. The four children were members of a family of eight children of a first-cousin marriage. The most constant clinical feature was a tendency to develop a rough reddening of the skin on exposure to moderate sunlight, and in two cases a severe rash identical with that of pellagra was observed. A severe rash has on a few occasions been associated with very severe but reversible cerebellar ataxia. There seems to be a biochemical fault, since the four siblings constantly excrete large amounts of amino acids and of indole compounds in the urine and a large amount of protoporphyrin in the fæces. The older siblings are also mentally retarded. It is suggested by the authors that this may represent an abnormality of nicotinic acid utilization.

TREATMENT AND PROGNOSIS OF HEPATIC COMA

Sherlock and her colleagues from the Postgraduate Medical School of London, England, (*Lancet*, 2: 689, 1956) outline the treatment they have used in 66 cases of hepatic coma or pre-coma. Experimental work has suggested that protein and nitrogen-containing drugs should be withdrawn from patients in impending hepatic coma. Other work has suggested the use of wide-spectrum antibiotic therapy by mouth to protect against adverse neurological effects of methionine. In the present series of 66 patients with liver disease complicated by hepatic coma or pre-coma, diagnosis was based on clinical findings, serial biochemical tests, aspiration liver biopsy, and in some cases autopsy. Hepatic cirrhosis was the most common primary liver disease. The neuropsychiatric syndrome consisted of progressive impairment of emotional control and intellect, the patient passing from stupor into coma. Flapping tremor, increased muscle tone, hyper-reflexia and ankle clonus were common signs.

Three lines of treatment were used. The intestines were emptied and kept free of all nitrogen-containing material, by stopping all dietary protein and giving 1600 calories daily as glucose drinks or by intragastric drip. During recovery protein was added in 20 g. increments on alternate days. Vitamin K and B complex supplements were given parenterally. Secondly, chlortetracycline was given, if necessary by stomach tube, a loading dose of 2 g. being followed by 0.5 g. six-hourly for up to one week. Thirdly, any precipitating factor was energetically treated. A common precipitant was gastrointestinal hæmorrhage, which was treated by an œsophageal compression balloon and blood transfusion. Another precipitating factor was sedatives, so that these were only used in unavoidable and minimal doses; morphine was absolutely contraindicated. Intravenous sodium glutamate was given on 12 occasions without obvious result.

Of the 66 patients, 39 recovered, 21 of whom had been in acute deep coma. It is noteworthy that 13 patients with chronic neuropsychiatric changes were maintained on low-protein diets for two to 24 months without signs of protein malnutrition. Prognosis was better in cirrhosis than in acute virus hepatitis, and if treatment was initiated before coma began. Survivors from acute hepatitis complicated by coma usually recovered completely; seven out of eight patients with cirrhosis and deep coma were alive a year after treatment.

CONCENTRATION OF BLOOD LIPIDS FOLLOWING PROLONGED ADMINISTRATION OF LARGE DOSES OF NICOTINIC ACID IN HYPERCHOLESTEROLÆMIA

Administration of nicotinic acid in large doses to patients with hypercholesterolæmia and an abnormally high ratio of beta-lipoprotein cholesterol to alpha$_1$-lipoprotein cholesterol (beta/alpha$_1$ ratio) caused the pattern of the blood lipids to change toward normal in the majority of patients. The plasma cholesterol decreased significantly in nine of 13 patients observed for 12 weeks and in three of five other patients observed for 4 weeks. The beta/alpha$_1$ ratio was reduced in 11 of 13 patients observed for 12 weeks and in four of five other patients observed for 4 weeks. The concentration of total lipids in the plasma was reduced in most of the patients but to a lesser degree than was the concentration of cholesterol.

Side reaction, consisting of flushing and pruritus, tended to diminish rapidly after the first few days of treatment. Urticaria, nausea and vomiting, which were observed in a few patients, subsided when the drug was withheld temporarily and did not recur when administration was resumed.—W. B. Parsons, Jr., *et al.* (*Proc. Staff Meet., Mayo Clin.*, 31: 377, 1956).

LEUKÆMIA AND DIAGNOSTIC IRRADIATION

A preliminary report is given from the Department of Social Medicine, University of Oxford (*Lancet*, 2: 447, 1956), of a survey which will eventually cover some 1,500 children who have died of leukæmia or malignant disease before the age of ten, in Britain in the years 1953 to 1955. Preliminary analysis of approximately one-third of the case material has given a result which the authors considered should be reported at once. The preliminary analysis was focused mainly on the x-ray histories. There was one important difference between the children who had died and their controls; the number of mothers who had had an x-ray of their abdomen during the relevant pregnancy was 85 in the cases of malignant disease, and only 45 in controls. It is suggested that this evidence implies that children who are radiographed before they are born are more prone to develop leukæmia and other malignant diseases than controls.

(Continued on advertising page 45)

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REVIEW ARTICLE

THE EXTRA HEART SOUND

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RECENT ADVANCES in the treatment of heart disease, particularly cardiovascular surgery, have contributed to an increased interest in cardiac auscultation. The interpretation of an "extra heart sound" is a frequently occurring problem of practical importance, as one may gather from the large volume of literature on the subject. Most of this literature, however, deals with the difficult problems of methods of production of these sounds or their physical analysis by refined techniques. There is little other than his stethoscope to help the general physician at the bedside when presented with the problem of an extra heart sound. It is the purpose of this paper to present a simple, practical classification of these sounds, to discuss briefly their significance and to outline a method of clinical analysis. We will deal only with the common extra heart sounds and confine our remarks to what we have seen and believe to be true. For purposes of orientation, one may classify the "extra heart sounds" that may be heard commonly, as follows (Table I):

I. *Systolic Extra Sounds*
1. Pistol shot sound.
2. Systolic gallop or click.

II. *Split Heart Sounds*

III. *Diastolic Extra Sounds*
1. The opening snap of mitral stenosis.
2. The physiological third sound.
3. Ventricular diastolic gallop.
4. Auricular gallop.

Unless the physician listens specifically for it, it is surprising how often an extra heart sound will be overlooked. Auscultation of the heart must therefore be approached with a definite systematic routine. Many physicians find self-catechism helpful: are the individual heart sounds of unusual intensity? . . . are there any abnormal sounds or murmurs in systole? . . . in diastole? . . . etc. This, of course, must be carried out at different points over the chest. In addition one must cultivate the technique of "tuning in" when listening for extra sounds as well as cardiac murmurs, as will be described shortly.

The great majority of extra sounds are of low pitch, their fundamental frequencies being entirely or mostly in the lowest audible range, below 200 cycles per second (Fig. 1).

TABLE I.

Extra heart sound	*Location*	*Quality*	*Chest piece*	*Timing*	*Significance*	*May be confused with*
Pistol shot sound	Usually best heard over aortic area and carotids	Frequently louder than first sound	Bell or diaphragm	Usually early systole	Large and forceful stroke volume; most common in aortic insufficiency	Normal first or second sound
Systolic gallop or click	Usually best heard over apical area	Similar to normal sounds or clicking quality	Usually best with diaphragm	Usually mid systole	No pathological significance	Diastolic extra sound
Split heart sound	Any area but most frequently pulmonic area	"Close" quality to split	Usually best with diaphragm	First or second sound	Wide splitting suggests bundle branch block	Opening snap, when sound widely split
Opening snap of mitral stenosis	Left sternal border or apical area	May have high frequency components	Diaphragm or bell	Early diastole 0.08-0.10 sec. after second sound	Important sign of mitral stenosis	Frequently called "gallop rhythm"
Physiological third sound	Apical area	Low pitched and often faint; waxes and wanes	Bell with light pressure	Early diastole 0.12-0.16 sec. after second sound	No pathological significance	Opening snap or ventricular diastolic gallop
Ventricular diastolic gallop	Apical area	Low pitched and often faint	Bell with light pressure	Early diastole 0.14-0.16 sec. after second sound	Important sign of "heart failure"	Usually not detected rather than confused
Auricular gallop	Any area; often well-heard supraclavicular fossæ	Low pitched and often faint	Bell with light pressure	Late diastole and in front of first sound	Usually no pathological significance	Usually confused with ventricular diastolic gallop

As illustrated in Fig. 2, the conventional stethoscope has a limited range for transmission of sound because of poor response below 150 cycles per sec. and above 1,500 cycles per sec. It should also be noted that the bell type of chest piece transmits the lower frequencies at greater intensity than the diaphragm type. It is for this reason that, clinically, the bell is more useful than the diaphragm in detecting low-pitched sounds such as gallops and rumbling diastolic murmurs. If, however, pressure is exerted when the bell is used, the skin and underlying tissue will become rigid and damp out the lower frequencies, as the diaphragm chest piece does. Because the fundamental frequencies of many extra heart sounds occur in this very low range and are often produced with low intensity, one must use the bell chest piece with very light pressure for effective transmission. The occasional extra sound may have numerous high frequency components and will

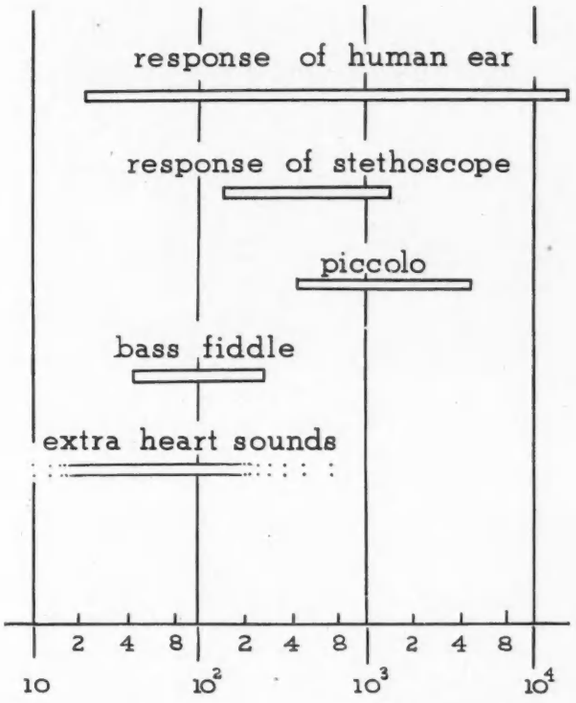

Fig. 1.—Graph to illustrate that the fundamental frequencies of extra heart sounds occur in the lowest audible range, mostly below 200 cycles per second.

have better definition when the diaphragm is used. This applies particularly to the systolic click and frequently the opening snap of mitral stenosis. It is thus apparent that effective auscultation requires the use of both the bell and diaphragm; the bell with light pressure for low-pitched sounds, and the diaphragm with firm pressure for high-pitched sounds. In this way, one may filter out undesirable sounds which might otherwise obscure the picture.

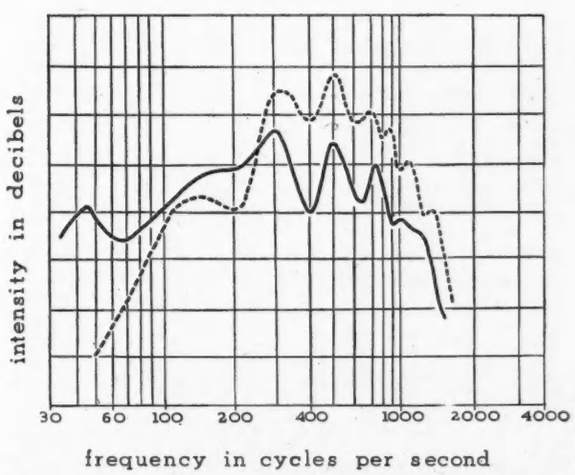

Fig. 2.—Graph to illustrate frequency response of stethoscope. Note effective range of response is from about 150 to 1,500 cycles per second. Note also that bell type of chest piece transmits the lower frequencies at greater intensity than the diaphragm type. Unbroken line = bell-type stethoscope. Broken line = diaphragm-type stethoscope.

Before one can readily recognize the fainter types of extra heart sounds, it is usually necessary to have them first demonstrated, preferably on patients or by high fidelity recordings. In this way an aural memory is acquired that allows one to quickly "tune in" when searching for the sounds. This can be compared to listening to certain musical instruments in an orchestral selection. It is a common experience in teaching auscultation to encounter a student or resident who is unable to hear an apparently obvious murmur or heart sound. If the finding in question is first demonstrated vocally or by a tape recording so that an aural memory is acquired, it can then usually be quickly identified in the patient. This experience is cited to underline the importance of the technique of "tuning in".

The very low pitch of any of the extra heart sounds is valuable because the ear may effectively discriminate against high-pitched murmurs, breath sounds or extraneous noises. This is an important function of the ear that is not possessed by the phonocardiogram. Once it is recognized that in addition to the usual two heart sounds an extra sound is present, the most valuable point to establish is the timing of the sound. By this is meant whether it occurs in systole or diastole and the interval of separation from the first or second sound.

One may establish what is systole and what is diastole in four possible ways. (1) By listening over the aortic area it will be found that the normal second sound is louder than the first in the great majority of patients. The interval preceding the second sound will thus represent systole, and that following it, diastole. (2) At normal heart rates, systole is shorter than diastole. (3) The presence of a characteristic murmur will quickly define these periods. For example, the blowing decrescendo murmur of pulmonic or aortic insufficiency or the low-pitched rumbling murmur of mitral stenosis or Austin Flint murmur produces a typical sound which is never heard in systole. The experienced auscultator, of course, will "instinctively" or reflexly employ the above techniques with no loss of time. (4) Some observers find that palpation of a carotid artery during auscultation is helpful. It is our experience, however, that this more frequently results in confusion.

Frequently, even after using the above techniques, one will still be uncertain as to the exact timing of an extra sound. This is particularly true when the heart rate is increased. In this case, the technique of "inching" may be employed. This procedure is an important aid which should be more frequently used. Here one first listens over the aortic area and decides what is systole and what is diastole. Then the chest piece is moved stepwise and rhythmically downward over the precordium (at each point the auscultator redefining systole and diastole in spite of changing intensity and quality of the first and

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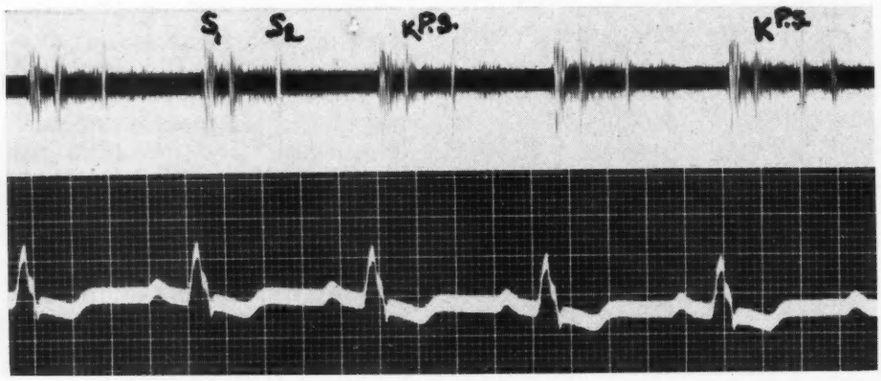

Fig. 3.—Pistol shot sound. Note timing toward early systole. S_1 = first sound, S_2 = second sound, P.S. = pistol shot sound.

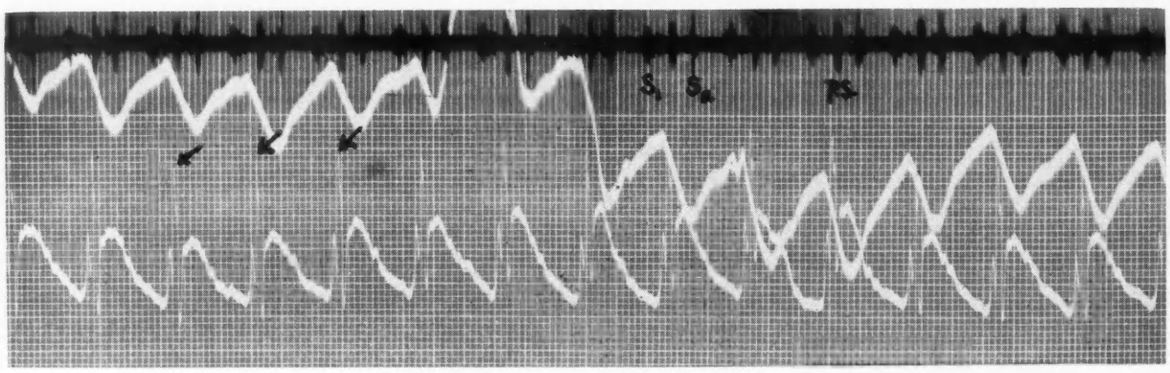

Fig. 4.—Pistol shot sound. Note timing toward mid systole. S_1 = first sound, S_2 = second sound, P.S. = pistol shot sound. Middle tracing is left border electrokymogram. Lower tracing is carotid pulse curve. Note vibration on carotid pulse curve which corresponds to pistol shot sound.

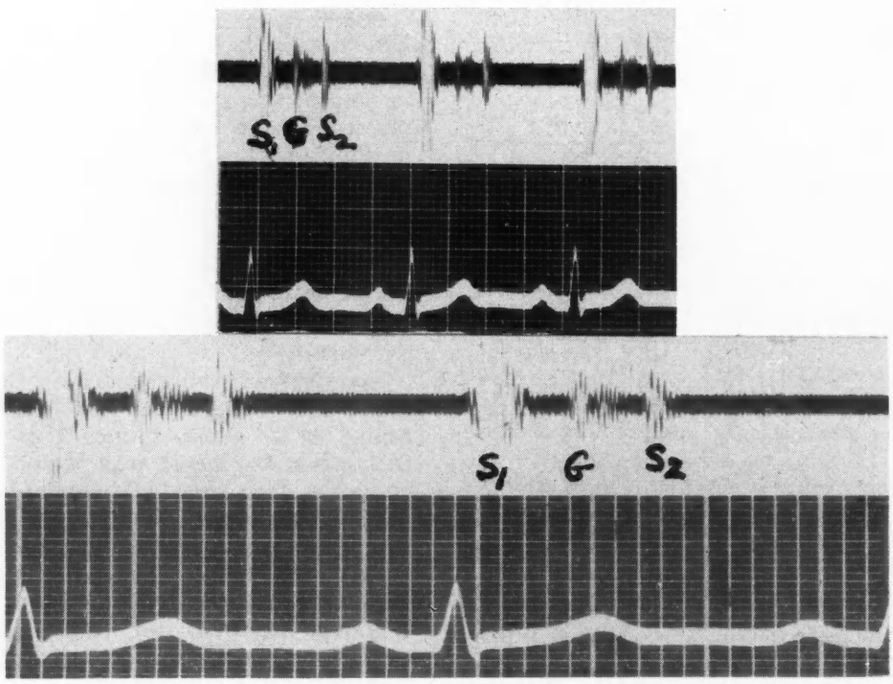

Fig. 5.—Systolic gallop. Note timing in mid systole. S_1 = first sound, S_2 = second sound, G = systolic gallop.

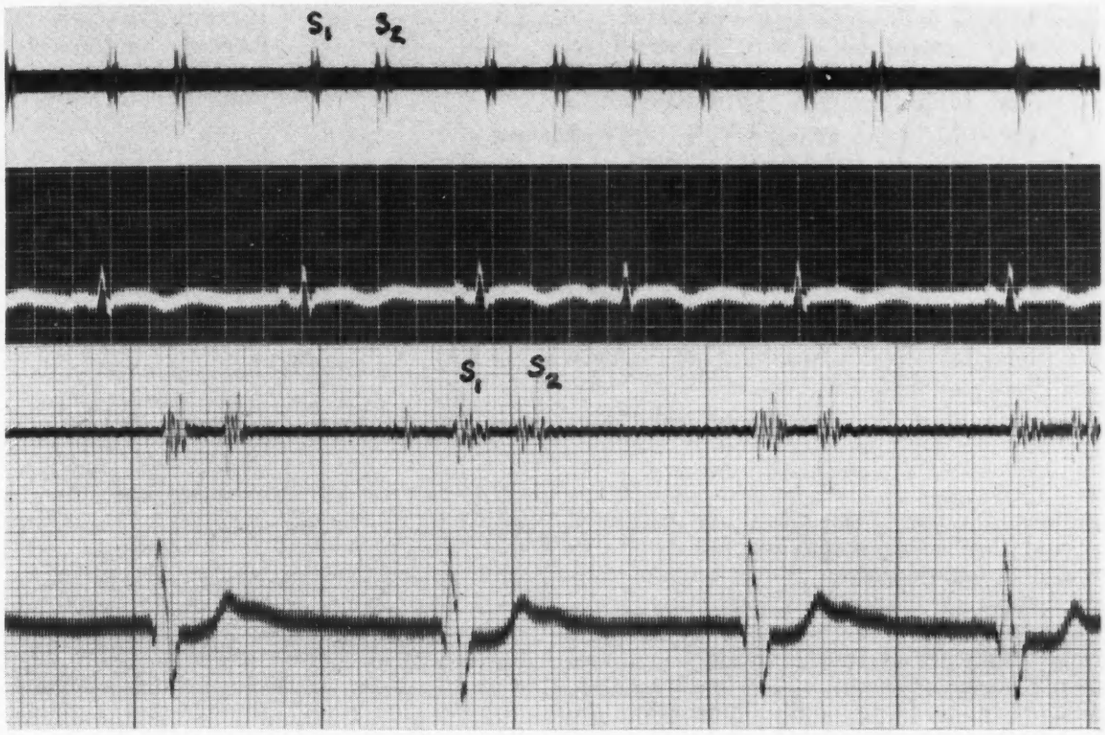

Fig. 6.—Split heart sounds. Upper example shows splitting of heart sounds with the usual "close" interval. Lower example shows wide splitting in a case with right bundle branch block. S_1 = split first sound. S_2 = split second sound.

second sound) until the extra sound appears, which in most cases will be along the lower left sternal border or over the apical area. If the extra sound is best heard over the base of the heart, one may start "inching" at the apex, defining systole and diastole by their relative duration (or a murmur), and move upward until the extra sound appears. When the extra sound first appears, it may be found helpful to move back and forth at this point to be certain of the timing.

By utilizing these techniques and with a little experience, one can in the great majority of cases establish correctly whether the extra sound is systolic or diastolic.

SYSTOLIC EXTRA SOUNDS

If the extra sound is systolic in timing, one need consider usually only two main possibilities, the pistol shot sound and the systolic gallop (or click). The pistol shot sound may be found in any condition in which there is a large and forceful stroke volume; however, it will rarely be encountered by the general physician except in cases of aortic insufficiency. Here the sound tends to occur in the early or mid part of systole and is generally best heard over the base of the heart and subclavian and carotid arteries (Fig. 3). It is due to vibrations in the aorta, related to rapid distension and tensing of the wall of the vessel (Fig. 4). Since this sound is more common in marked or "free" aortic insufficiency, it is rarely of any value diagnostically; the other auscultatory sounds and the peripheral findings are usually classical. The importance of this sound is that it is commonly mistaken for the first sound because of its loudness.

The second variety of extra heart sound heard in systole is referred to as a systolic gallop or click. Some authorities subdivide these sounds, but since their meaning in terms of cardiac dynamics is not understood, for practical purposes they may be considered together. The sound may have a quality similar to the first and second sound or may have numerous high frequency components, hence the two terms, systolic gallop and systolic click. This sound may be encountered anywhere over the precordium and usually occurs toward mid systole (Fig. 5). In the classical case one hears, therefore, a rapid triplet (first sound, systolic gallop, second sound) alternating with a relatively long pause, diastole. This systolic sound usually occurs in patients with no demonstrable heart disease and has little diagnostic significance. We have seen a number of patients who have been diagnosed as having organic heart disease only on the basis of a systolic gallop. It is, therefore, important to correctly identify this sound to avoid the expense of further tests, hospitalization and anxiety on the part of the patient.

A SPLIT HEART SOUND

If the extra sound is very close to the first or second sound, a split sound is said to be present (Fig. 6). One may consider the first sound as

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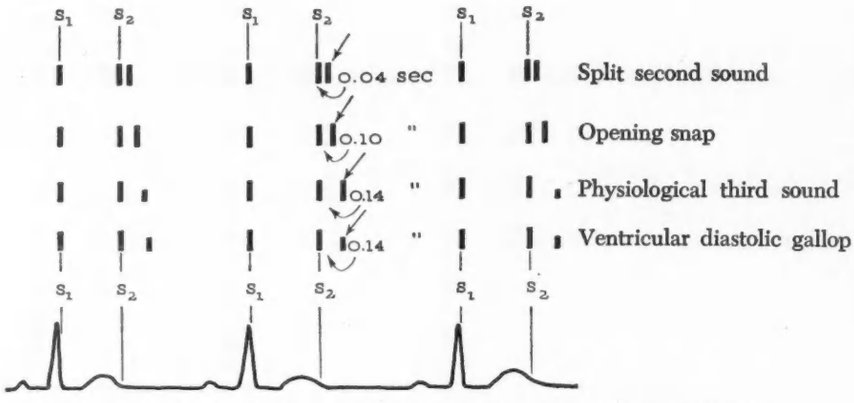

Fig. 7.—Composite of extra sounds occurring in early diastole. Note the time relationships after the second sound. S_1 = first sound. S_2 = second sound.

being due to closure of the mitral and tricuspid valves and the second sound to closure of the aortic and pulmonic valves. It has been clearly shown that in many normal people there is a slight asynchronous contraction of the two ventricles. Splitting of heart sounds, therefore, commonly occurs normally and is of little diagnostic significance. Occasionally, close attention to the split sound may prove of value in diagnosis. For example, the presence of a split second sound rules out the congenital malformation of truncus arteriosus communis. If there is a wide splitting of the heart sounds, one may suspect the presence of a bundle branch block (Fig. 6). It is important to emphasize that in the great majority of cases, split sounds will have a characteristic "close" quality and should not be confused with the other phenomena to be described.

DIASTOLIC EXTRA SOUNDS

If the extra sound is found to be in diastole in timing, one must usually consider only four possibilities: (1) The opening snap of mitral stenosis. (2) The physiological third sound. (3) The ventricular diastolic gallop. (4) The auricular gallop. In the usual case, in the absence of tachycardia, one can readily determine by the techniques described above not only that the extra sound is in diastole but which portion of it.

If the extra sound occurs in early diastole after the second sound, one must next estimate the interval between it and the second sound. This is often a difficult task for the beginner in auscultation. A split second sound may have an interval of separation of 0.04 sec. (Figs. 6 and 7). The opening snap of mitral stenosis occurs about 0.08 to 0.10 sec. after the second sound, and the physiological third sound or ventricular diastolic gallop occurs about 0.14 to 0.16 sec. after the second sound (Figs. 7, 8, 10, 11). We must, therefore, differentiate between sounds that are very close together in timing, that is, have a difference in separation from the second sound of only 0.04 to 0.06 sec. However, there is no question that the ear with a little experience can usually estimate these intervals. When confusion does arise, the extra sound usually has an atypical interval. For example, the opening snap of mitral stenosis in the occasional patient may occur as long as 0.12 sec. after the second sound, while in another patient a ventricular diastolic gallop may occur as early as 0.12 sec. after the second sound. However, these cases are definitely the exception and when difficulty arises in this situation other findings usually permit differentiation.

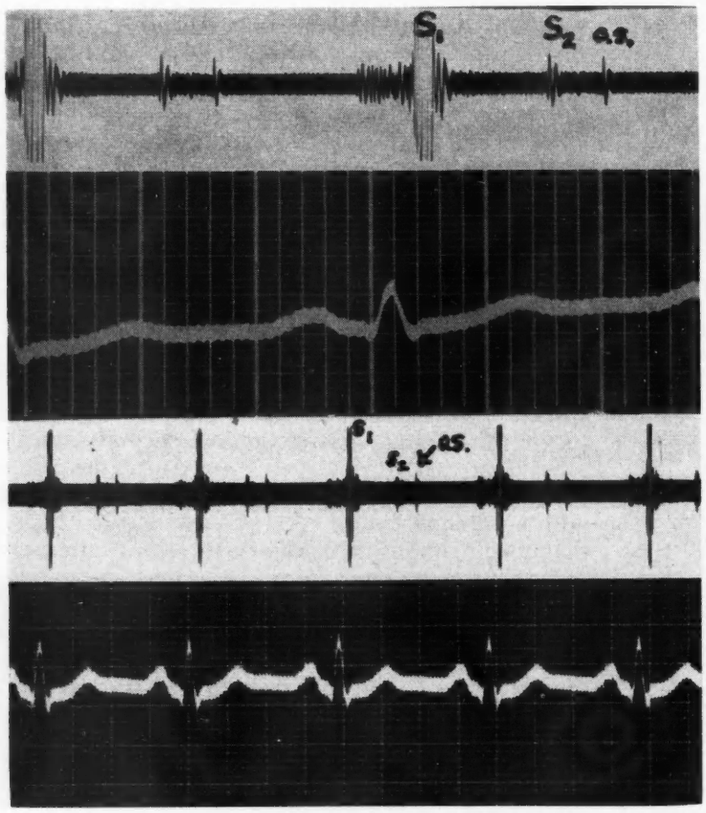

Fig. 8.—Opening snap of mitral stenosis. Note extra sound occurs 0.09 sec. after second sound. Accentuated first sound and presystolic murmur of mitral stenosis are also evident. S_1 = first sound. S_2 = second sound. O.S. = opening snap.

As indicated above, the opening snap of mitral stenosis will be recognized by its characteristic timing and the company it keeps. This requires ear training, acquired by listening either to patients or recorded sounds. The opening snap

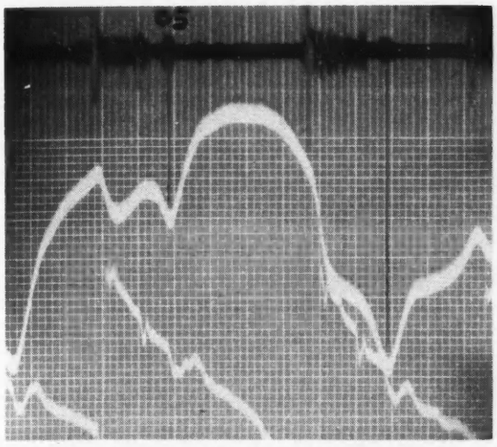

Fig. 9.—Opening snap of mitral stenosis. Middle tracing is left ventricular electrokymogram. Lower tracing is carotid artery pulse. Note that opening snap occurs at onset of ventricular filling (upstroke of electrokymogram signifies onset of ventricular filling). O.S. = opening snap.

occurs later than a split sound and earlier than a ventricular diastolic gallop or physiological third sound (Figs. 7 and 8). It is usually best heard over the area to the left of the lower sternum or over the apex. In about one-half the cases, it may also be heard over the base of the heart. It may be of any intensity. When it is loud, numerous high frequency components are present, giving it a sharp or snappy quality. It is generally believed that the opening snap is due to the sudden tensing of the "diaphragm" formed by the thickened and fused mitral leaflets, at the onset of ventricular filling when the mitral valve opens in early diastole (Fig. 9). This may be compared to the snapping taut of a sail in the breeze.

The presence of an opening snap is a valuable auscultatory finding. It is found so uncommonly in diseases other than mitral stenosis (occasionally with sickle cell anæmia, cardiac tumour and constrictive pericarditis) that it may be considered almost pathognomonic of this valvular lesion. It is often the first clue to mitral stenosis, and when found is a signal to search for other evidence which will be present in nearly all cases. It may be added at this point that one should hesitate to diagnose mitral stenosis in the absence of the characteristic diastolic rumble. The reasons for this are discussed below.

An opening snap will not be apparent in about 15% of the proven cases of mitral stenosis. However, the absence of this sound together with lack of accentuation of the first sound may be taken as strong evidence against mitral stenosis. This is valuable when one is rapidly screening a large group, such as schoolchildren or military personnel, and cannot search routinely for the characteristic murmurs.

When the opening snap is accompanied by the other classical findings of mitral stenosis, namely an accentuation of the first sound and a loud, low-pitched rumbling diastolic murmur filling practically all of diastole (often with a presystolic accentuation), one may state with certainty that the patient has had prolonged rheumatic activity resulting in valvular disease with a dynamically significant narrowing of the mitral orifice and requires evaluation for mitral surgery. There are few signs in medicine which take so little time to demonstrate and yield so much information.

If the extra sound is found to occur in early diastole at a more prolonged interval after the second sound than is the case with the opening snap, one must consider the physiological third sound and the ventricular diastolic gallop (Figs. 10 and 11). As noted above, these sounds occur about 0.14 to 0.16 sec. after the second sound. Both may occasionally occur at an earlier time, the physiological third sound more often than the ventricular diastolic gallop. Again it must be emphasized that these sounds will be recognized correctly only if the physician has acquired an aural memory image by listening to patients or recordings. The widest familiarity with cardiac dynamics or phonocardiograms is not a substitute. The timing of these sounds is

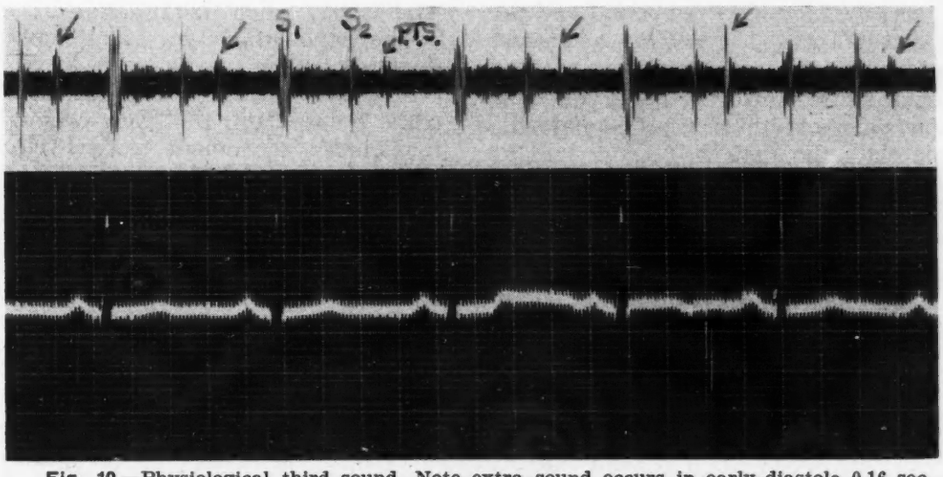

Fig. 10.—Physiological third sound. Note extra sound occurs in early diastole 0.16 sec. after second sound. Note also variation in intensity from cycle to cycle. S_1 = first sound. S_2 = second sound. P.T.S. = physiological third sound.

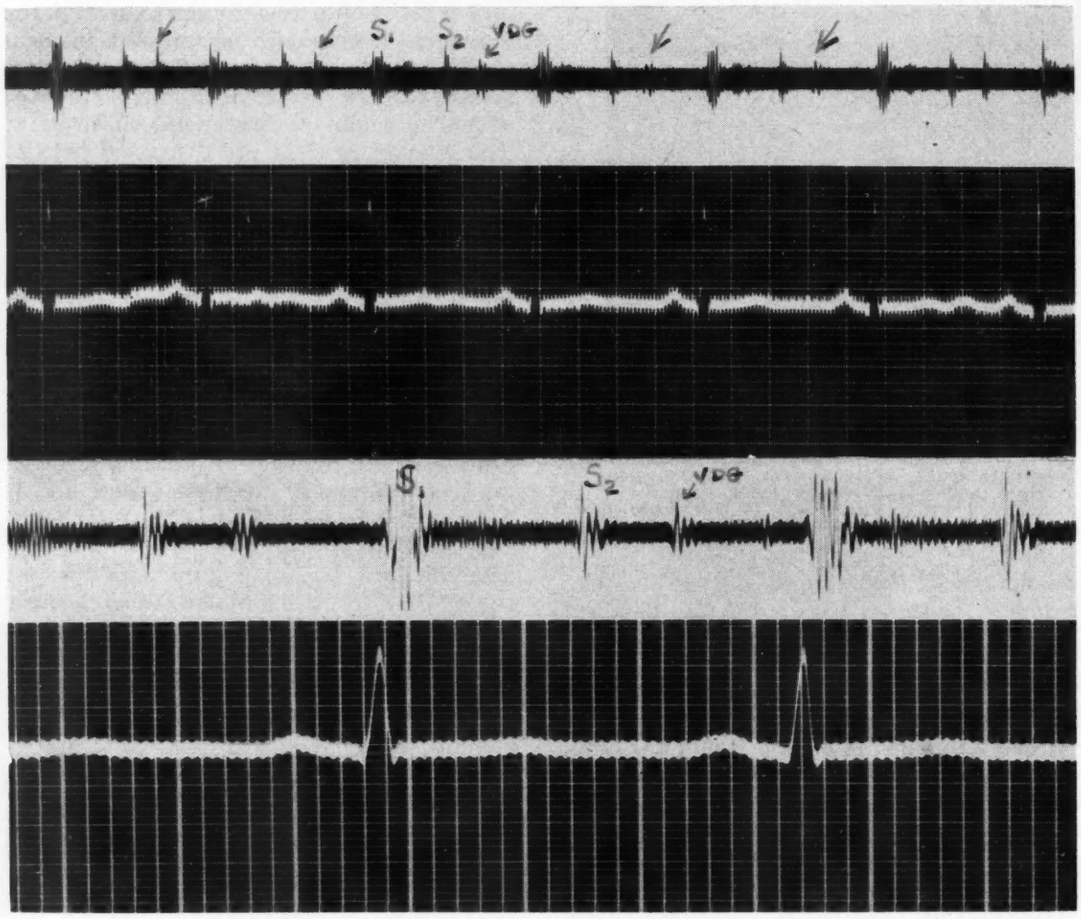

Fig. 11.—Ventricular diastolic gallop. Note extra sound occurs in early diastole 0.16 sec. after the second sound. Note also the constant intensity from cycle to cycle. S_1 = first sound. S_2 = second sound. V.D.G. = ventricular diastolic gallop.

such as to simulate the rhythm of a galloping horse, particularly when the heart rate is rapid. When it is stated that a gallop rhythm is present, it is usually implied that a ventricular diastolic gallop is the mechanism. However, as will be explained shortly, one cannot safely diagnose these sounds on the basis of whether or not a canter or gallop sequence is present. In most cases both the physiological third sound and the ventricular diastolic gallop are of low pitch and usually faint.

To demonstrate a faint ventricular diastolic gallop or physiological third heart sound, one should listen with the patient lying down; the room should be quiet and the physician in a comfortable position. The apical area is carefully explored with the bell chest piece, using only sufficient pressure to produce an air seal. If the diaphragm chest piece is used or if more than very slight pressure is used with the bell, one will almost always overlook the common faint type of sound. Finally the attention is concentrated on early diastole. Using these procedures, one will be surprised how often faint gallops will be detected. Failure to hear these sounds is probably responsible for the teaching that a ventricular diastolic gallop may sometimes be felt better than heard.

The physiological third sound can be heard in the majority of children, occasionally in young adults, and rarely after 35 years of age. It is a normal finding and of no consequence unless it is confused with the ventricular diastolic gallop. This latter sound is common in heart disease, particularly when "heart failure" is present.

The explanations regarding methods of production of these two types of sounds are numerous, which testifies to our lack of exact knowledge. Some claim that they originate from the momentary movement toward closure of the mitral (or tricuspid) leaflets at the end of the rapid ventricular filling phase consequent on the change in form of the ventricular chamber and

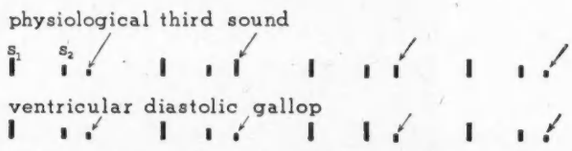

Fig. 12.—Comparison of physiological third sound and ventricular diastolic gallop. Note that both sounds occur at a similar interval after the second sound. The physiological third sound varies in intensity from cycle to cycle while the ventricular diastolic gallop is of a more constant intensity. S_1 = first sound. S_2 = second sound.

"rebound" of blood. Others believe that the sounds originate from the ventricular myocardium at the end of the rapid filling phase. In any event the common denominator in all cases showing these sounds appears to be rapid ventricular filling.

It has been reasoned that the ventricular diastolic gallop and the opening snap of mitral stenosis are mutually exclusive lesions in that they rarely occur in the same patient at the same time. It is probably true that the opening snap is a consequence of the mitral leaflets being unable to open normally with resulting slow ventricular filling, while the ventricular diastolic gallop is related to rapid ventricular filling. It may be reasoned, therefore, that the finding of a ventricular diastolic gallop is suggestive evidence that a tight mitral stenosis is not present.

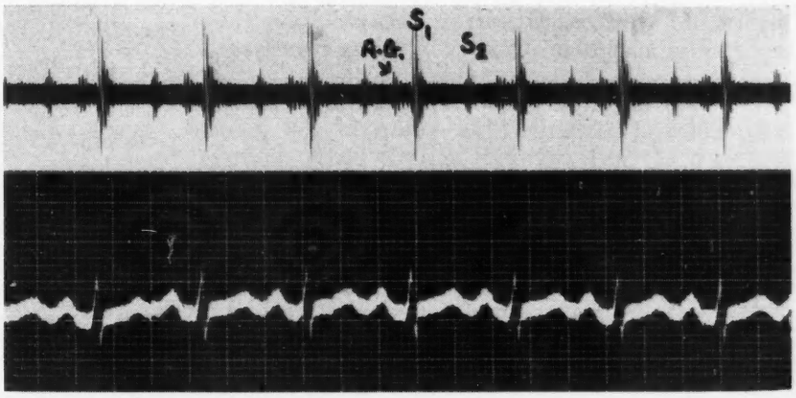

Fig. 13.—Auricular gallop. Note extra sound occurs in front of first sound. S_1 = first sound. S_2 = second sound. A.G. = auricular gallop.

At this point it may be asked how one differentiates between the physiological third sound and the ventricular diastolic gallop, in view of their similar timing. Occasionally the differentiation is impossible. However, if one compares the intensity of the sound over many cycles, it will be found that in the case of the physiological third sound a variation (waxing and waning) will usually be noted while the ventricular diastolic gallop will be of a more constant intensity in the majority of cases (Fig. 12). The final differentiation will be made after considering the age of the patient, the presence or absence of heart disease and its type.

Every time a ventricular diastolic gallop is suspected, one should carefully (and often repeatedly) check a pulsus alternans, as these two findings usually occur together and have the same serious significance. It is generally appreciated that a ventricular diastolic gallop implies a poor prognosis. While this is true in most instances, one must also base the prognosis on the nature of the heart disease. For example, one may hear an identical ventricular diastolic gallop in curable forms of heart disease such as patent ductus arteriosus or beriberi heart disease, as well as in more serious lesions such as myocardial infarction. We have repeatedly observed the disappearance of a ventricular diastolic gallop following treatment of a reversible form of heart disease.

It should be re-emphasized that a ventricular diastolic gallop is often overlooked. The chief reason for this is that many physicians are not trained to listen for faint sounds. Experienced clinicians who have carefully observed these sounds and followed up cases over the years have repeatedly stressed their important diagnostic and prognostic significance.

If the extra sound occurs in the latter part of diastole and in front of the first sound, an auricular gallop ("presystolic gallop") may be diagnosed (Fig. 13). This sound is of low pitch and often faint, but occasionally prominent. Because of its low frequency components, it is best heard with the bell chest piece using light pressure. It is usually most readily identified over the apical area but occasionally may be heard surprisingly well near the base of the neck in the supraclavicular fossæ. It is generally agreed that this sound is related to auricular contraction, but all explanations attempting to prove the method of production lack the quality of proof. The auricular gallop has been noted in patients with a prolonged PR interval, hypertension and a normal heart. In general, it has not been associated with serious heart disease as has the ventricular diastolic gallop. In children with suspected rheumatic fever, the finding of an auricular gallop, particularly in the presence of a faint heart sound, is a good clue to first-degree heart block — an important sign of

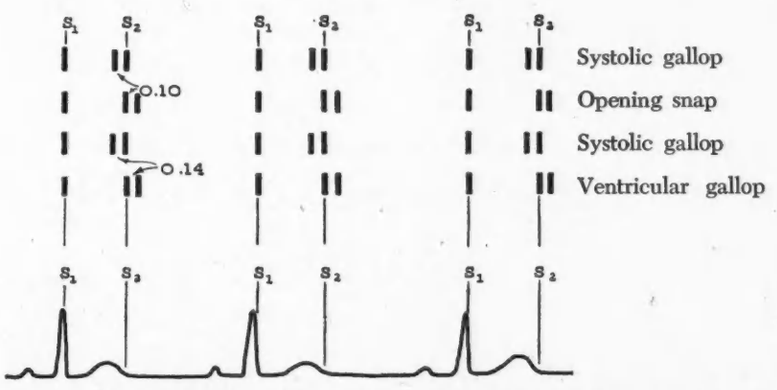

Fig. 14.—Illustration to show how a late systolic gallop may be confused with the opening snap of mitral stenosis (when situated about 0.10 sec. in front of the second sound) or the ventricular diastolic gallop (when situated about 0.14 sec. in front of the second sound). In both cases the second sound is misinterpreted as an abnormal sound. S_1 = first sound. S_2 = second sound.

rheumatic carditis. However, the chief importance of an auricular gallop is that it is commonly confused with other sounds, particularly the ventricular diastolic gallop. This is a serious mistake because a ventricular gallop in the great majority of cases signifies serious heart disease and a poor prognosis. It should be emphasized that the most important point in diagnosing the auricular gallop is the fact that it occurs in presystole in front of the first sound.

POINTS IN DIFFERENTIAL DIAGNOSIS

As noted above, the pistol shot sound is frequently loud. Because of this it is often mistaken for the first sound (the preceding first sound, if recognized, being mistaken for an auricular gallop). On the other hand, the pistol shot sound is sometimes misinterpreted as the normal second sound. "Inching" from the apex to the aortic area or from the carotid artery to the apex will prevent this error.

The frequent occurrence of an apical rumble (Austin Flint murmur), ventricular diastolic gallop and a loud pistol shot sound in aortic insufficiency may closely mimic the findings of mitral stenosis, thus causing the physician to diagnose combined valvular disease.

Evaluation of 100 cases operated upon for correction of aortic insufficiency, with actual exploration of the mitral valve in some, has shown that a dynamically significant mitral stenosis is an uncommon lesion in the presence of severe aortic insufficiency. Close attention to the following points should help prevent an unnecessary operation for mitral stenosis in these patients.

Mitral Stenosis	*Aortic Insufficiency*
1. Accentuated first sound	1. Loud pistol shot
2. Apical rumble	2. Apical rumble (Austin Flint murmur)
3. Opening snap	3. Ventricular diastolic gallop
4. Diastolic blow, left sternal border (Graham Steell murmur)	4. Diastolic blow, left sternal border

Occasionally a systolic gallop (or click) is encountered which occurs towards the end of systole, rather than in the mid portion. In this case it is often mistaken for the second sound, while the second sound is confused with an opening snap of mitral stenosis (if the interval of separation is about 0.10 sec.) or a ventricular diastolic gallop (if the interval is about 0.14 sec.) (Fig. 14). Also, in the presence of tachycardia, because of the shortening of diastole, the usual auscultatory finding of a rapid triplet alternating with a relatively long pause is not present. Under these circumstances, a systolic gallop is often very difficult to diagnose with certainty. If there is any question, phonocardiography is of great help.

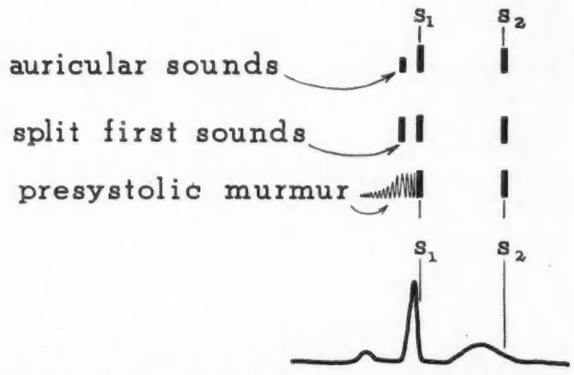

Fig. 15.—Composite to illustrate how an auricular gallop or a split first sound may be misinterpreted as a presystolic murmur because of the similar timing. S_1 = first sound. S_2 = second sound.

Occasionally one may encounter the widely split second sound (about 0.08 sec.), as may occur with a bundle branch block (Fig. 6). This splitting will of course mimic exactly the timing of the opening snap of mitral stenosis. In cases of this type, the electrocardiographic findings of bundle branch block and the absence of a loud first sound and apical diastolic rumble should prevent a mistake in diagnosis.

Mitral stenosis is too often erroneously diagnosed because of misinterpretation of auscultatory findings. Commonest errors have included: (1) misinterpretation of auricular gallop or a split first sound for a presystolic murmur (Fig. 15); (2) misinterpretation of a loud first sound, related to a short PR interval (a normal finding), for the accentuated first sound of mitral stenosis; (3) misinterpretation of a split second sound, late systolic gallop, physiological third sound or ventricular diastolic gallop for an opening snap. Combinations of the above may mimic closely the findings of mitral stenosis; for example, a split first sound (misinterpreted as a presystolic murmur) of increased intensity because of a short

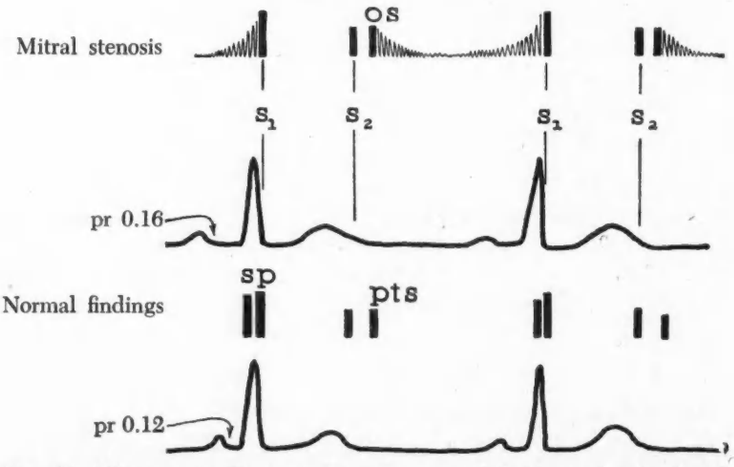

Fig. 16.—Diagram to illustrate how the normal findings of a loud and split first sound with a physiological third sound may mimic the findings of mitral stenosis. S_1 = first sound. S_2 = second sound. S.P. = split first sound. O.S. = opening snap. P.T.S. = physiological third sound.

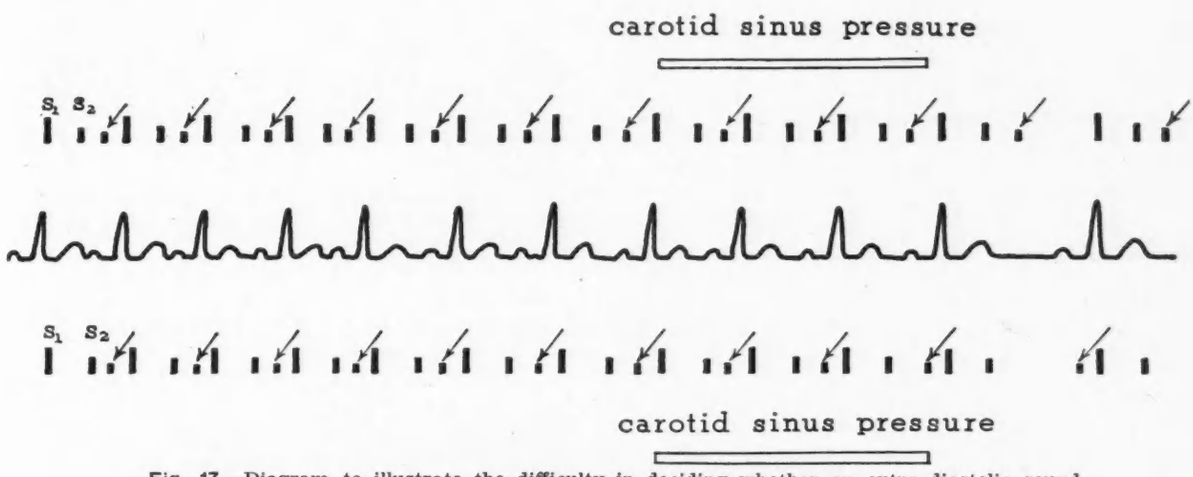

Fig. 17.—Diagram to illustrate the difficulty in deciding whether an extra diastolic sound is in early or late diastole when tachycardia is present. With carotid sinus pressure and slowing of the heart rate the sound in question will remain in front of the first sound or after the second sound, thus permitting differentiation. S_1 = first sound. S_2 = second sound.

PR interval (mistaken for the accentuated first sound of mitral stenosis) and a physiological third sound (mistaken for an opening snap) (Fig. 16).

When interpreting extra heart sounds, one must pay careful attention to the possible part played by heart rate. At slow heart rates the canter quality that one usually associates with a ventricular diastolic gallop is absent. On the other hand, in the presence of tachycardia, the systolic gallop and opening snap have a canter quality that occasionally simulates the ventricular diastolic gallop. It is obvious, therefore, that one cannot make a definite diagnosis on the basis of a canter quality. Slowing of the heart rate by means of carotid sinus pressure or prostigmine may be required for clear differentiation in the presence of tachycardia. Again, with tachycardia and shortening of diastole, it is frequently impossible to say whether the extra diastolic sound occurs shortly after the second sound ("protodiastolic") or in front of the first sound ("presystolic"). With carotid sinus pressure or prostigmine, slowing of the heart rate will reveal the exact nature of the sound in question (Fig. 17). If, with slowing, the extra sound remains in front of the first sound, we are dealing with an auricular gallop. If the extra sound remains after the second sound, one must consider the possibilities discussed above. Occasionally with slowing of the heart rate, the sound in question will be found to be a fusion of an auricular gallop and a ventricular diastolic gallop, i.e. with slowing it will separate into two sounds, one being in front of the first sound (an auricular gallop) and the other remaining after the second sound (usually a ventricular diastolic gallop).

In view of the foregoing, one can readily appreciate the confusion that has arisen from the use of such terms as "protodiastolic", "mesodiastolic" and "presystolic". We feel that these terms are best avoided and an attempt should be made to classify an extra sound in the manner suggested above.

SUMMARY AND CONCLUSION

Extra heart sounds are of common occurrence in health and disease. Their recognition and interpretation depends on careful auscultation and evaluation of the total clinical picture. We have attempted to present a simple practical classification of the common extra sounds that the physician will encounter at the bedside, discuss briefly their significance and outline a method of clinical analysis.

Observations and phonocardiograms were based on clinical material studied at Georgetown University Hospital, Washington, D.C., during the author's tenure of a Research Fellowship in Cardiology.

The author expresses his indebtedness to Dr. W. Proctor Harvey, without whose teaching and guidance this study would not have been possible.

267 O'Connor St.

STUDIES IN RESTORATIVE GROWTH PROCESSES IN MAMMALIAN WOUND HEALING

The measurement of growth data for restorative processes in the healing of wounds has, in the past, been largely based on measurements of size. But mitotic counts are often below normal during regeneration, and a growth survey to portray synthesis of living tissue seeks to document an event which largely fails to occur over the period of observation. The tactics of regeneration, as of embryonic development, is primarily and fundamentally a matter of movement of cell substance, cells and cell groups.

In a series of experiments on rabbits, the growth of the repair blastema, contraction, and the epimorphic regeneration of epithelium, have been studied and growth curves established. A large part of the data based on wound healing measures contraction which is the dominant process. Contraction is important in the healing of wounds and it is not related to the differentiation and shortening of collagen in granulation tissue. Contraction is distinct from cicatrization. Contraction is decreased by certain kinds of wound dressings, infection and irradiation, whereas cicatrization is increased by them.—H. A. S. Ven Den Brenk, *Brit. J. Surg.*, 43: 525, 1956.

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PUBLIC RELATIONS FORUM

Conducted by L. W. HOLMES
Assistant Secretary, C.M.A.

PUBLIC ATTITUDES TOWARDS DOCTORS. II.

THIS IS THE SECOND in a series of articles reviewing the results of a public opinion survey conducted for the American Medical Association. In this article two aspects are discussed: the attitude of the doctor towards himself and his profession, and miscellaneous public impressions about doctors.

DOCTORS' VIEWS ABOUT DOCTORS

Interestingly enough, the survey pointed up a significant fact – that the opinions of doctors themselves about other doctors may contribute to the fact that the medical profession is not as highly thought of as are its individual members.

Public and doctors agree closely in their appraisals of most doctors on intelligence, capability and willingness to accept medical advances.

Eighty-eight per cent of the doctors rate most doctors as highly intelligent as contrasted to 98% of the public who say this is true of their own doctors and 93% who say this is true of most doctors. Ninety-two per cent of the doctors say most doctors are very capable and this closely parallels the attitudes of the public who indicate that 99% of their own doctors are very capable and that 92% of all doctors are very capable. Eighty-seven per cent of the physicians deny that the medical profession is slow to try new drugs and treatments while 72% deny this charge for their own doctors and 64% deny it for most doctors.

Doctors' opinions of doctors generally fall midway between the public's opinion about their own doctors and about most doctors.

On six questions doctors reflect views about their colleagues which represent a position midway between what the public thinks of their own doctors and of most doctors: (1) dedication to mankind; (2) over-readiness to recommend surgery; (3) inability to secure a doctor in an emergency; (4) longer waits than necessary; (5) belief in their own infallibility; and (6) lack of personal interest in patients.

Do you think	*(Public) my doctor true*	*Doctors re doctors true*	*(Public) most doctors true*
Doctors are not as dedicated to serving mankind as they should be?	6%	23%	27%
Doctors are too quick to recommend an operation?	5%	10%	31%
Doctors are hard to reach for emergency calls?	19%	32%	51%
Doctors keep people with appointments waiting longer than necessary?	15%	27%	41%
Doctors have the idea they are always right?	23%	36%	43%
Doctors do not have enough personal interest in their patients?	11%	21%	39%

But in some instances, doctors are more critical of most doctors than the public is.

Doctors are more inclined to say that physicians do not give the patient as much time as the patient would like. However, this may indicate that physicians feel most patients want too much time. Doctors also seem to feel that most physicians are not frank enough in discussing patients' illnesses, that doctors think they are better than most people, and that most doctors try to cover the mistakes of other medical men.

Do you think	*(Public) my doctor true*	*(Public) most doctors true*	*Doctors re doctors true*
Doctors don't give the patient as much time as the patient would like?	18%	60%	80%
Doctors are not frank enough in talking to patients about their illnesses?	15%	46%	47%
Doctors think they are better than most people?	5%	25%	28%
Most doctors try to hide other doctors' mistakes?	(not asked)	54%	58%

Only on questions of income and fees do doctors have more favourable opinions of themselves than people have of their own doctors.

In three questions pertaining to the economic side of medicine doctors defend their fees. Eighty-six per cent of the doctors deny that most doctors plan to get rich quick. Seventy-seven per cent of the public deny that their own doctors plan to get rich quick and 52% of the public deny that most doctors anticipate quick financial gain. In regard to fees, 87% of the doctors deny that most doctors charge too much. Seventy-nine per cent of the public say their own doctors do not charge too much and 44% say that most doctors' fees are not too high. Only 6% of the doctors think medical service charges have gone up faster than other living costs, but 13% of the public make this assertion in regard to their own doctors' charges and 35% about most doctors' charges.

Doctors themselves feel they are most appreciated for their competency, sincerity and the healing art. They expect the public to be most

critical of their fees, the fact they are not always readily available, and indifference.

When doctors were asked what favourable ideas they think people have about the medical profession, a fifth (19%) say they have no idea of what the public likes about them and 4% deny entirely that people like them. However, 30% say they think people like them best for their competence, intelligence and the healing art. In answer to a question about what unfavourable ideas people have about doctors and the medical profession, doctors overwhelmingly (71%) list fees as that aspect most likely to come in for public criticism. Yet only 16% of the public think their own doctors' charges are too high. Other aspects which doctors think people might not like so well include: inability to reach a doctor in a hurry (18%); impersonality, coldness and indifference (11%); hurrying patients too much (7%); and incompetence (6%).

It seems evident that the individual doctor needs to form a better opinion of his colleagues and to convey that opinion to his patients. If he himself helps create derogatory impressions of other doctors, he thwarts the public relations efforts of his profession.

OTHER PUBLIC IMPRESSIONS ABOUT DOCTORS

The public recognizes that long years of training are required for the practice of medicine, as well as the fact that most doctors work beyond the 65-year retirement age.

People seem to have a good understanding of the long training period necessary to become a physician. The median amount of post-high school training and internship mentioned by the public is nine years and the most common answer is eight years. Some speak of 11 years or more.

A fourth (26%) of the people also say most doctors never retire, a belief corroborated by actual figures in America today. Farm dwellers most often say (35%) that doctors never retire. About 10% of the public say doctors retire between ages 60-64; 20% say they retire between ages 65-69, and 14% say they retire between ages 70-74.

People also have realistic ideas of the doctor's long work week and the amount of charity work done by the medical profession.

Their average estimate is that their own doctors work more than 60 hours a week. They list 64 hours as the median estimate of their own doctor's work week as compared to 63 hours for most doctors. Doctors themselves report about the same total working hours.

The public believe that their own doctors give about 12% of their time to charity cases. They make the same estimate for doctors as a group, citing 12% as the median figure. These estimates agree with those of physicians, who report that a median of 13% of their time is given to charity work, including free clinic time. However, about 40% of the public makes no estimate in regard to doctors' charity work.

Belief that a doctor shortage exists is not as widely held as might be expected. Neither public nor doctors think the shortage is self-imposed by the profession.

To investigate opinions in regard to the supply of doctors this question was asked: "Would you say there are too many doctors in this part of the country, about the right number, or not enough?"

	Public	*Doctors*
Not enough	53%	20%
About the right number	39%	58%
Too many	2%	18%
No opinion	6%	4%

Two-fifths of the people compared with three-fourths of the doctors say there are enough or too many doctors in their area. Farm residents are most inclined (64%) to believe there are not enough doctors in their part of the country. Residents of the West (42%) and of medium-sized cities (43%) least often say this. The need for additional doctors is felt most often by those physicians practising in the southern (26%) and central (28%) states and in smaller towns (31%) and by general practitioners (27%).

The charge that the medical profession (or A.M.A.) tries to hold down the number of physicians was denied by both the public and the profession. Only 12% of the public and 7% of the profession think the medical profession does try to limit the supply. Forty-four per cent of the people say the medical profession or the A.M.A. tries to get more doctors and 33% of the doctors asserted this was true. The highest proportion of doctors who say the A.M.A. tries to restrict the number of doctors are found among non-members and doctors who do not like the A.M.A.

People correctly estimate the degree of medical specialization today and less than half of the public criticizes this trend. The public does not necessarily consider specialists to be more capable than general practitioners are.

The median estimate of the public is that about one-third of all doctors are specialists. This agrees closely with the actual proportion of full-time specialists—36%, according to the A.M.A. Bureau of Medical Economic Research. When asked whether most doctors were becoming too specialized, 47% of the public say it is true as against 34% who say it is false. A larger percentage of physicians (57%) say they think most doctors are becoming too specialized. Criticism of over-specialization comes most often from general practitioners (70%). Smaller proportions of the specialists agree: 51% of the internists, 48% of the surgeons, and 46% of the other specialists.

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In answer to the question, "Which kind of doctors do you think are most capable in the work they do—general doctors, surgeons, or other specialists?", surgeons receive a slightly higher rating by the public with general practitioners scoring a close second.

Surgeons	29%
General doctors	24%
Other specialists	20%
All about the same	16%
Qualified answers	1%
No opinion	10%

Westerners most often (24%) say that other specialists are the most capable. Retired persons and others with no workers in the family give the general practitioner the highest credit (30%) on this score. Easterners most often (21%) say that all are equally competent.

Most people see their own doctor as someone special and think that choice of physician is of great importance today.

The public apparently believes that choosing a physician is more important today than it was 20 years ago. Fifty-eight per cent say it matters a lot these days as opposed to 44% who say it mattered a lot 20 years ago. The only groups in which less than the majority agree are non-whites (46%), people who never entered high school (49%), and people who have no family doctor (48%). The special groups, except the pharmacists, are even more convinced that choice of a physician is important—67% of the editors and commentators, 71% of the lawyers, 75% of the nurses, 67% of the medical society executive secretaries, and 57% of the druggists say choice matters a lot.

Those who say it matters a lot list these reasons for their answers: abilities, training, equipment, confidence, sincerity, acquaintance with the patient's past history, congeniality, personality, and interest. Those who say choice is not important are more inclined to say it doesn't matter because all doctors have the same education and qualifications and that one is as good as another.

A third of the public offers recommendations for physicians, mostly for doctors as individuals.

The suggestions of the public tend to emphasize the traditional concepts of the family doctor. Here are answers in reply to this question: "Have you thought of anything that the medical profession or individual doctors could do to get along better with the public? What?"

Make themselves available, come when called	6%
Lower their fees	5%
Take more personal interest	5%
Be more friendly, more sociable	4%
Be honest and frank on illness and fees	3%
Don't rush patients, take more time	3%
Keep their appointments better	2%
Inform the public, public relations	2%

According to the survey, family doctors are highly regarded by their patients, and doctors in general are looked upon favourably, although not as favourably as are personal physicians. Areas of public dissatisfaction are almost entirely in the economic realm.

VOICE OF THE PUBLIC PRESS

Hospital Insurance.—A recently reported Gallup Poll conducted by the Canadian Institute of Public Opinion suggests that "public wish for a government-operated plan for hospital insurance is increasing at a rapid rate . . . and well on to three-quarters of the adults of the country are in favour of it." Last April 62 per cent of the public was in favour of such a plan; today 72 per cent is, the Institute reported. Five months ago 24 per cent was opposed; today 21 per cent is opposed. The remainder of the respondents either qualified their answers or were undecided. And of the 72 per cent which was in favour, 52 per cent wants the insurance scheme even if it meant higher taxes. *(Montreal Star)*

Press reports indicate that the Federal Government may introduce national hospital insurance legislation at the next session of Parliament, making last January's offer to the provinces a take-it-or-leave-it proposition. The reports state that Government may reserve $200,000,000 in the 1957-58 budget to cover all possible federal costs should all provinces join. *(Globe and Mail)*

Canada's Doctors Tops.—In an interview in Toronto Dr. Charles W. Mayo ranked Canadian doctors and medical procedures with "the best in the world." To support his opinion he said: "More than 20 per cent of the students in our postgraduate schools are Canadians."

Traffic Accidents.—Early this year and again at the Association's 89th Annual Meeting, the C.M.A. Committee on Traffic Accidents announced sponsorship of a foundation to investigate the medical aspects of traffic accidents in Canada to be supported by funds from industry. This announcement resulted in much favourable editorial comment.

The *Saskatoon Star Phoenix* had this to say:

". . . A commendable program. . . . The entire idea makes good sense. . . ."

From the *Globe and Mail:*

"The medical profession of the world has attacked one problem after another of the fatal and crippling diseases which beset man until most of them have now been conquered or controlled. But heretofore, the causes of one of the greatest destroyers—traffic accidents—have been overlooked. Thus the significance of The Canadian Medical Association's proposals to turn its attention to this problem cannot be exaggerated.

"The projected study is the fulfillment of the broad medical responsibility to preserve life. . . . The C.M.A. is pioneering. . . ."

The *Montreal Star* said:

"The . . . plan could serve a useful purpose."

Editorially the *Toronto Star* stated:

". . . The Canadian Medical Association is spearheading the establishment of a foundation to sponsor such research. . . . The doctors' approach will appeal to those who want the guess work taken out of accident prevention. . . . It is hoped industry and government at all levels will rally to this cause."

And the *Calgary Herald* editorialized:

"All Canadians . . . will wish this new project well. . . ."

Men and Books

THE CANADIAN DERMATOLOGICAL ASSOCIATION—FIRST 25 YEARS*

The late DONALD E. H. CLEVELAND, M.D., and R. ROY FORSEY, M.D., F.R.C.P.[C.],†
Montreal

IN 1949 THE LATE Dr. Donald E. H. Cleveland was asked to be historian of the Canadian Dermatological Association. He accepted the position and with his customary enthusiasm began gathering material for a history of the society. He sent letters to all members requesting that they send in notes, programs, pictures, etc., pertaining to the early years. Dr. Cleveland began writing this history and had just completed it when he was stricken by a cerebral accident in December 1953. It is my intention to present abstracts from Dr. Cleveland's material and to quote some of his personal anecdotes and character sketches of the early days.

In May 1924, Dr. Omar Wilson of Ottawa invited a group of dermatologists from Montreal, Toronto and Hamilton to an informal clinical conference in Ottawa. There does not seem to be any definite record of those attending this meeting, but from an old minute book kept by the late Dr. J. Frederick Burgess it appears that the idea of a Canadian dermatological association was first suggested at this meeting. It was some 24 months before the society was born. On May 26, 1926, at the Ontario Medical Association meeting in London, Ont., the four dermatologists present—Dr. G. Gordon Campbell, Dr. Omar Wilson, Dr. E. J. Trow and Dr. W. R. Jaffrey—met for a social period to discuss the topics of the day. These four dermatologists were the founders of the Canadian Dermatological Association. Dr. Cleveland records that "their common bond of interest was dermatology; that they could be described in felicitous Johnsonian phrase as 'an assembly of good fellows' there can be no doubt. No group that was drawn together around Omar Wilson could be other than that. To the best of my information the original spark came to life in his brain." Dr. Omar Wilson graduated from McGill in 1904, M.D., C.M.; he undertook postgraduate study at the New York Skin and Cancer Hospital and in Vienna, London, Berlin and Paris. He resided and practised dermatology in Ottawa. He was dermatologist to the Ottawa Civic Hospital and consultant dermatologist to the Ottawa General Hospital. He was president of the Ottawa Medical Chirurgical Society and a founding member of the Ottawa Academy of Medicine. He was a reserve officer in the Canadian Army Medical Corps and consultant dermatologist to the Canadian Department of Pensions and National Health. He died of coronary thrombosis on April 18, 1933. He was a man of intense energy, keenly interested in athletics, active in golfing and curling, and a vigorous student, not only of the skin but of all things material and spiritual which it contained or which impinged upon it. Dr. Cleveland writes, "All the familiar phrases which attempt to describe energy personified—live wire, ball of fire, or 'that wild red-headed Canadian' as Sarah Burns of the New York Skin and Cancer Hospital was often known to refer to him—are hardly adequate to describe him."

Dr. George Gordon Campbell was born in Nova Scotia in 1863. He graduated from the Faculty of Medicine, McGill University, in 1889. Following his internship he undertook postgraduate studies in England and on the Continent. On returning to Montreal he was for many years Physician-in-Charge of the Outpatient Medical Services of the Montreal General Hospital. He became assistant to Dr. Shepherd in the Skin Clinic and became Chairman of the Department when it was made a separate department on February 1, 1921—a post which he held until he retired in 1927. His interests were widespread; he was a clinician of great skill and ability, clear-minded and exact and had a wide and accurate knowledge of many branches of medicine. In addition he had an unusual knowledge of the natural sciences. In botany and zoology he was an authority. His interest in physics led him into photography, at which he was an expert—indeed nothing in nature seemed foreign to him.

Under an appearance of brusqueness he had an unusual capacity for friendship and his friendships were lifelong. His patients naturally became his friends and remained so until his death. For many years he was a member of the Editorial Board of the Montreal Medical Journal, and he was author of a textbook, "Common Disorders of the Skin", published in 1920. To my knowledge he is the only member of the Canadian Dermatological Society who has produced a textbook on diseases of the skin.

Dr. William Reginald Jaffrey was born in Fredericton, New Brunswick, in 1887. He graduated from Queen's University in 1913. He became a fellow in pathology at his alma mater and assistant bacteriologist to the Ontario Provincial Board of Health. A year later, in 1914, he became assistant bacteriologist to the New York Postgraduate Medical School. In 1915 he moved to Hamilton, Ontario, where he began his practice in dermatology. He was appointed city pathologist of Hamilton from 1915-19. He was of a quiet, retiring disposition, modest, but known by his hearers as one who spoke with authority. He suffered much from cardiac disability in the later years of his life. He died on August 17, 1950.

*Read at the 10th Annual Meeting of the Canadian Dermatological Association, Quebec, June 16, 1956.
†Historian, Canadian Dermatological Association.

The fourth member of this august group, Dr. E. J. Trow, is too well known to require any words from me.

As one might expect when a group of dermatologists get together, there seems to have been considerable difficulty with nomenclature. The first name which appears in the old minute books kept by Dr. Burgess is the Canadian Inter-Urban Dermatological Society, and meetings were bi-annual. The first formal meeting was held on June 11 and 12, 1926. While no actual list of the members present has been found, it would appear that Drs. Gordon Campbell, Phil Burnet, Fred Burgess, Omar Wilson, W. R. Jaffrey, E. J. Trow, H. A. Dickson and K. Smith were charter members and Drs. C. R. Bourne, L. D. Mason and Barney Usher, all of Montreal, were elected members at this first meeting. Dr. G. Archambault of Montreal and Dr. F. C. Harrison of Toronto were elected members at the second meeting in December 1926.

At this meeting Dr. King Smith was asked to approach the British Association of Dermatologists and Syphilologists with a request that the Canadian society be affiliated with the British society. This affiliation was also being considered by the British society, for a letter was sent to Dr. King Smith by Dr. MacLeod, Secretary of the British society, dated November 9, 1926. Dr. MacLeod states, "you have a Canadian Dermatological Association and I wonder if we could not make some arrangements by which your society might become the Canadian branch of the British Association of Dermatology and Syphilology. You would elect your own members over there on the same lines as we appoint here with the same regulations regarding appointment. You might make the same arrangements with regard to subscription—namely £2.12.6d. per annum or whatever you wished and pay to this side £2.12.0. for the journal. We would publish your transactions. That would mean that there would be a strong rapprochement between the old country and yourselves, so far as dermatology is concerned, because we would be under the same organization and be able to attend and take part at each other's meetings." Dr. MacLeod goes on expressing his views that he thinks this would be a good idea and requests that Dr. King Smith give it some thought. He felt that if Canada did this, he would try to get the men in Australia and New Zealand to do likewise and in this way we would have an Imperial Dermatological Association.

The first letter from Dr. King Smith to Dr. MacLeod, dated December 14, 1926, states, "A number of those interested in dermatology met in Montreal last Saturday and formed a Canadian Dermatological Association." He goes on to say who was present and what papers were presented, adding that in an informal round table discussion on various subjects "I suggested that it might be a good thing for our new society if we could in some way become associated with the British Association of Dermatology and Syphilology; it was received with much favour and was left in my hands to see if this could be brought about." Armed with this letter Dr. MacLeod then went to the British Association. On March 25, 1927, he wrote to Dr. King Smith: "At a meeting of the executive committee of the British Association of Dermatology and Syphilology it was unanimously decided to cordially invite the Canadian Dermatological Association to become affiliated to the British Association of Dermatology and Syphilology, the requirements for membership being the same and each member agreeing to take the journal at 2 gns. per annum. I take it you would prefer to call your association the Canadian Dermatological Association, affiliated to the British Association of Dermatology and Syphilology, rather than the Canadian Branch of the British Association of Dermatology and Syphilology but this is a matter for your association to decide."

It would seem from this correspondence that the Canadian Inter-Urban Dermatological Association rapidly became known as the Canadian Dermatological Association. The suggestion of its becoming the Canadian branch of the British Dermatological Association seemed to have come from the British society. At the third meeting of the society held on May 7, 1927, by previous arrangement it was moved by Dr. E. J. Trow and seconded by Dr. King Smith that the name be changed to the British Association of Dermatologists and Syphilologists, Canadian Branch. This motion was carried and this remained the name of the society for the next twenty years.

At the meeting in 1928 a resolution of no small historic interest was adopted, inviting Dr. Francis J. Shepherd of Montreal to be honorary president of the Canadian branch. A gracious note of acceptance was received from Dr. Shepherd, although there is no record of Dr. Shepherd's attending a meeting or that he was particularly interested in the society. I quote from Dr. Cleveland's papers: "The name of Shepherd is evocative to the present writer as that of one with whom for several years he had a personal acquaintance, and the following paragraphs of personal reminiscences are included without apology, for he was one of the greats of Canadian Medicine." In 1921 when he (Dr. Cleveland) asked Dr. Shepherd for a letter of introduction to Dr. John Fordyce of New York, mentioning that he intended practising dermatology in Montreal when his training was completed, the reply in a note of 3-4 lines was not encouraging and contained the statement "I do not think there is much future for dermatology in Montreal." This introduction to Dr. Fordyce was not included.

Shepherd's interest in dermatology is rather remarkable. Its initial stimulus was received from attendance at Jonathan Hutchinson's clinic in Stamford Street Skin Hospital in London in 1873. In Howell's excellent biography "The Life and Times of F. J. Shepherd" there is no further mention of dermatology until it is noted that in 1886 Shepherd was elected a member of the American Dermatological Association. Howell comments, "This is no small compliment to one to whom dermatology was only a sideline, for the other members who numbered only 40 were all specialists." Another silence with regard to his dermatological activities follows until it is recorded by Howell that in 1901 Shepherd was president of the American Dermatological Association. Of the 123 papers in his list of writings compiled by Howell, 13 are on dermatological subjects, all of them, with the exception of his presidential address read before the American Dermatological Association which was published in the Montreal Medical Journal, being case reports.

"Shepherd was an unforgettable figure. He was of middle stature, stoutly built and bore a handsome head. He wore a carefully kept square-trimmed beard. His blue eyes were alert and wide but not prominent and showed frequently a satirical sparkle. These, with his active movements and confident bearing, plainly indicated frankness, honesty, complete self-possession and self-confidence. If he laughed, it was not at a time when it might appear to diminish his dignity before his students. He laughed at but not with them; his humour was not spontaneous or gay, but most often sardonic. For the students in the final year in my time Dr. Shepherd gave a series of weekly clinics in the dispensary or one of the small theatres in the Montreal General Hospital. This was the only dermatological teaching in McGill in those days. There was an abundance of material. We could have done better with one-tenth of the number. In the course of an hour some 50 patients walked in one door like mannequins in a fashion show, sometimes wearing a trifle less, passing before 70-odd students in single file at slow revue march time, occasionally pirouetting to display their eruptions to better advantage. Such unfamiliar terms as "salt rheum", tetter, Lassar's paste, oil of cade and chrysarobin (we learned to recognize that as a specific for psoriasis by the purple undershirt and the orange mahogany skin which the patient was displaying) buzzed about our ears. "Salt rheum" and "tetter" were part of Shepherd's Hutchinsonian heritage. Occasionally we were edified by a demonstration of the use of liquid air; an acolyte stood by the open Dewar flask into which Frankie dipped a wad of absorbent cotton on the end of a long dressing forceps, flourished it and applied it to corns, warts and other benign tumours. This was several years after Possey had demonstrated the greater convenience of solid carbon dioxide. In the background hovered a young gentleman, Dr. A. O. Friedman, preparing and demonstrating microscopic preparations of fungi, itch mites and other small fry.

"Shepherd was, as is apparent from his published papers, a clinical observer of no small acumen but the gross rather than the minute interested him, and his dermatological philosophy was utilitarian and pragmatic. Apart from that it was merely an entertaining hobby, to which a man concerned with matters of greater moment might condescend on occasion. I do not believe that he ever regarded dermatology as anything more than that, and looked upon those who devoted their entire time to it as all very well in their way but rather frivolous-minded."

During the succeeding years the society gradually grew so that the membership in 1938 was 26. The first meeting which I attended was the annual meeting of 1945. I attended as a guest. This meeting would seem to have been very important from several points of view. It was at this meeting that Dr. Burgess served notice of motion, seconded by Dr. Trow, that the name of the Association be changed to the Canadian Dermatological Association and that its affiliation with the British Association be continued. It was felt at this time that the old name was rather ambiguous and caused considerable confusion. The secretary was instructed to write to the British Association of Dermatologists and Syphilologists acquainting them with the motion and requesting that the friendly relationships be maintained. I remember sitting out in the old Outpatient Department of the Royal Victoria Hospital while the business meeting took place. I distinctly remember our secretary, Dr. Arthur Birt, sitting out with me, somewhat worried as to whether or not he would be elected to membership. Fortunately for the society, it would seem that he was elected; however, I have been unable to find any record of this in the minutes.

At the annual meeting in 1946 the name was formally changed to the Canadian Dermatological Association. The first unofficial meeting of the newly named C.D.A. was held in Cleveland, Ohio, on December 11, 1946. The reason for this was that most of the members were attending the American Academy of Dermatology and Syphilology meeting, held in Cleveland. The purpose of this meeting was to draw up a constitution and series of by-laws for the new society. The first annual meeting under the new name was held in Winnipeg in 1947. By this time the membership numbered 41. The society has continued to flourish and today has 90 members. The annual meetings have been numbered from 1947.

1414 Drummond St.

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GENERAL PRACTICE

INFECTIOUS HEPATITIS

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INFECTIOUS HEPATITIS is one of the more common of the infectious diseases found in the world today. It and serum hepatitis are included in the broader classification of viral hepatitis. This paper is concerned with infectious hepatitis and recent concepts in its diagnosis and treatment.

As a disease infectious hepatitis gained wide recognition during the last 15 years because of its high incidence and morbidity rate among military personnel. This was particularly true during the Second World War, among troops in the Mediterranean area, and more recently in Korea. As a result, considerable study has been devoted to the problem, but many questions are still unanswered. In this paper we shall consider some of the more recent advances, particularly as they affect the general practitioner, who handles the majority of these cases.

ETIOLOGY

The exact etiology of infectious hepatitis is as yet unknown. Like serum hepatitis, it is thought to be caused by a hepatotropic, filterable infective agent, probably a virus, not as yet identifiable by specific serological or cultural methods, which produces a systemic disease characterized by a typical variety of liver damage in the human being. Since both diseases are thought to be due to a virus infection, the etiological agents have been called virus IH or "A" for infectious hepatitis, and virus SH or "B" for serum hepatitis.[1] The incubation period for virus IH is 2-6 weeks, and for virus SH is 1½-6 months. Some authorities suggest that virus SH may be an attenuated form of virus IH.

The infective agent of infectious hepatitis is known to pass through filters which retain bacteria, and hence is thought to be a virus. It is fairly resistant to both physical and chemical agents. Fæcal filtrates of patients affected with the disease have been found to produce infectious hepatitis when inoculated into human volunteers. Urine and nasopharyngeal washings do not appear to be infective. The disease usually confers immunity, and gamma globulin from pooled human plasma produces passive immunity if given early in the incubation period.

*Read to the Section of General Practice, Ontario Medical Association, Toronto, May 1956.

EPIDEMIOLOGY

Until recent years infectious hepatitis was called infective hepatitis, catarrhal jaundice, and epidemic jaundice. Epidemics of these diseases have been recorded for centuries, particularly among institutional groups and military personnel.

The disease is thus spread through close personal contact, the mode of transmission being the intestinal-oral route. Ingestion of contaminated food and water is also a factor in some outbreaks. Since there is thought to be a stage of viræmia when the virus is present in the blood, it is possible that the disease may be spread occasionally by using poorly sterilized needles and syringes.

The seasonal incidence seems to be indefinite, but the disease often reaches a peak in the fall and early winter. The age of greatest susceptibility appears to be from five to 15 years, with no special sex incidence. During endemic times it is commoner in urban groups, whereas in epidemic times it is higher in rural groups. There is no known animal host.

CLINICAL MANIFESTATIONS

Some authorities suggest that as many as 70% of infections due to the infectious hepatitis virus are non-icteric. This may be particularly true in young children who present symptoms of gastroenteritis and the same physical findings as in infectious hepatitis but no jaundice.

The course of acute icteric infectious hepatitis may be divided into three stages: (1) pre-icteric, (2) icteric, (3) post-icteric.

1. The first symptoms of infectious hepatitis are those of a constitutional disturbance—general malaise, anorexia, nausea and vomiting. In addition there is usually fever, headache, myalgia, upper abdominal pain, perhaps a rash, dark urine, clay-coloured stools, and frequently pruritus.

Physical examination may reveal some elevation of temperature, upper abdominal tenderness, and pain on percussion of the ribs overlying the liver. Posterior cervical lymphadenopathy may occur. This pre-icteric period lasts an average of five days. The laboratory tests of most help at this stage are urinalysis and determinations of serum bilirubin and the bromsulphalein retention. Results of thymol turbidity and cephalin-cholesterol flocculation (CCF) reactions of serum may be elevated this early.

2. With the onset of jaundice, many symptoms disappear but the lassitude and asthenia persist. Temperature returns to normal, but stools remain light and urine dark in colour. Pruritus and upper abdominal discomfort usually persist. Once the jaundice reaches its peak, the anorexia subsides and appetite improves, producing a concomitant gain in weight.

During this stage there is definite icterus of the skin and scleræ, the liver is usually palpable

and tender, but rarely is the spleen palpable. Bradycardia or slow pulse often occurs in deeply jaundiced patients, and occasionally spider angiomata are found.

3. The post-icteric period is characterized by a gradual return to normal strength and energy, which may require several weeks.

Complications of infectious hepatitis do occur but need not occupy our attention now, save to mention that they may lead to one of three main clinical pictures: (1) gradual progression to hepatic coma and death; (2) recurrent or subacute hepatitis; (3) cirrhosis.

DIAGNOSIS

Because of the lack of specific tests for infectious hepatitis, the diagnosis of the disease depends upon clinical and epidemiological evidence, along with certain non-specific laboratory procedures.

During the acute pre-icteric stage one must consider the possibility of other acute infectious diseases, the causes of the acute abdomen, and gastrointestinal disorders. Pain or tenderness around the liver should make one suspicious. If the correct diagnosis is still in doubt, it is most essential to do serum tests *early* and all at the same time. This supplies one with a baseline by which to judge any subsequent tests, for it is well established that persistent extrahepatic obstruction will eventually lead to sufficient hepatic damage to produce positive tests for intrahepatic disease. In addition, one should examine serial specimens of urine to detect the presence of bilirubin and to observe any variation in amount of bilirubin from day to day.

During the icteric stage the problem is that of differential diagnosis of jaundice, that is, of differentiating extrahepatic from hepatocellular causes, or medical from surgical jaundice. One must also rule out certain noxious chemical agents such as cincophen, phosphorus, and chlorpromazine, as well as infectious mononucleosis. Here, the laboratory is of the greatest help. Generally speaking, high rise in CCF and thymol turbidity suggests intrahepatic disease, whereas highly elevated alkaline phosphatase and total serum cholesterol with jaundice suggests posthepatic obstruction. Finally, a needle biopsy may aid in the diagnosis. However, even at best the diagnosis is based on presumptive evidence only.

During the convalescent stage, tests of bromsulphalein retention are useful for following the return of hepatic function to normal. The thymol turbidity and CCF usually decrease after the peak of the jaundice has been reached. During the post-icteric period an exploratory laparotomy may be necessary to rule out an obstructive lesion.

TREATMENT

There is no specific therapeutic agent available for infectious hepatitis. The disease usually runs a natural course to a spontaneous recovery. However, two general principles should guide management of the disease, namely: (1) the restriction of physical activity; (2) the provision of a diet adequate in calories and protein.[2] Considerable work, mainly among army personnel, has proven the wisdom of these two basic principles. Since at the onset one cannot determine which cases will have a fatal or complicated outcome, it is necessary to treat all cases in the same manner.

Recently in the United States a Committee on Hepatitis of the Commission on Liver Disease of the Armed Forces Epidemiology Board has issued a statement regarding the treatment of uncomplicated cases, based on a study of enlisted personnel in Korea.[3] Their findings and suggestions are worthy of mention and consideration. Whereas formerly patients were kept at bed rest until signs and symptoms were gone and most laboratory tests nearly normal, this committee now recommends that a patient with infectious hepatitis be kept at bed rest, preferably in a hospital, until all acute symptoms subside. Once the patient begins to feel better, and regardless of the degree of jaundice, he is allowed up and around the ward for an increasing length of time each day, but with an enforced rest period after each meal of 1-1½ hours, plus at least 9 or 10 hours' sleep each night. This freedom is limited to the hospital ward only, where the degree of activity can be regulated. It has been found that this method of early ambulation increases the patient's appetite, and decreases the period of convalescence by getting the patient to adapt to physical activity earlier. Thus the period of strict bed rest may last as little as five days, but persistence of symptoms of nausea, vomiting, fever and abdominal pain demands further bed rest. Patients are discharged from hospital when the total serum bilirubin level falls below 1.5 mg. per 100 ml. of serum, and the bromsulphalein retention in 45 minutes is below 6%. After discharge the patients have a physical examination and serum bilirubin estimation every two weeks. Although this report indicates that patients can be rehabilitated more quickly than on the older routine, it probably remains to be seen what long-term effects this earlier ambulation may produce.

It has been proven that dietary factors are important in the repair of liver damage in animals, and this is now thought to be true for human beings. The patient with infectious hepatitis should be kept on a diet of at least 3,000 calories, including about 150 g. of protein and 150 g. of fat, and an unlimited amount of carbohydrate. The fat helps to provide calories and makes the diet more palatable, and should be in the form of meat, eggs and butter.

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During the stage of anorexia one should encourage frequent small feedings. If vomiting is severe, intravenous glucose in water will help to maintain caloric and fluid intake. It is thought unwise to force-feed with a duodenal tube in very sick patients. Intravenous protein hydrolysates, plasma, blood, and lipotropes have been found to be of no special advantage. Similarly, if a planned and balanced diet is being taken, supplementary vitamins are probably not necessary. If nausea is a persistent complaint, the use of 10% glucose in water intravenously plus vitamins and drugs such as Pyribenzamine or Benadryl may be helpful. Vitamin B_{12} is thought useful by some people, especially to stimulate the appetite. The general practitioner often observes that patients feel they are receiving inadequate treatment unless they are taking a tablet or receiving an injection at periodic intervals! For that reason an injection of vitamin B complex, and preferably a brand that stings, is probably quite justifiable. More recently some work has been done on the use of ACTH and cortisone, but such drugs, if used at all, should be reserved for patients in relapse or more critically ill, and those suffering from severe anorexia.[4] Alcohol should be prohibited until laboratory tests give normal results, and is probably better avoided for the first six months. Also, narcotics and barbiturates should be avoided, and paraldehyde or Benadryl used when necessary for sedation.

PREVENTION

The prevention of the spread of infectious hepatitis is difficult because of the inability to recognize carriers, the several modes of transmission, and the resistance of the virus to physical stimuli. Since fæces are proven sources of infection, it seems advisable to place all known cases in so-called intestinal isolation for several weeks. It is likewise prudent to wash and disinfect the hands carefully after contact with the patient or his clothes.

Specific passive immunization against infectious hepatitis is obtained by the intramuscular injection of 0.01 ml. of concentrated human gamma globulin per lb. body weight before the onset of signs and symptoms of active disease. An important application of its use is in the protection of pregnant women exposed to infectious hepatitis, because of the greater incidence of chronic and progressive hepatic disease in this segment of the population. This, incidentally, does not protect against serum hepatitis. It is possible that with use of gamma globulin in this manner a patient may develop so-called "active-passive" immunization by virtue of acquiring a subclinical infection sufficient to produce an active immunity.

SUMMARY

An increasing amount of study has been devoted to infectious hepatitis during the past 15 years. A brief review of new concepts and confirmation of some older ones in the diagnosis and management of infectious hepatitis. is presented.

The author wishes to thank Dr. N. W. Scratch of Stratford for his helpful criticism of this paper.

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PRECEPTORS AS MEDICAL EDUCATORS

IN THE *Journal of Medical Education* for September 1956 (31: 598) Dr. Wescoe, Dean of the Medical School of the University of Kansas, outlines the very advanced program of preceptorship which has been running in connection with the University of Kansas School of Medicine since 1950. The idea of the program is to present to the medical student aspects of the practice of medicine which cannot well be shown him within the walls of a teaching institution. It is not designed specifically to teach the practice of medicine, but rather to demonstrate the medical way of life. The opportunity is given for a student in his fourth year of medical studies to live, work and study with a man in the active general practice of medicine. The student, during his preceptorship, is also able to gain some idea of the civic and social responsibilities of a practising physician, since he attends meetings of local medical societies, service clubs and other organizations. A further advantage of preceptorship is that the student is acquainted for the first time with the business aspects of the practice of medicine, including office management and medical economics. He is made aware of the reasons for the keeping of accurate records. He receives in addition a practical demonstration of the ethical relationships which must exist between a physician and his colleagues and between a physician and his patients. The need for and the techniques of continued medical education are made plain to him.

All these, however, are secondary to the primary purpose of the program, which is to teach a philosophic approach to the practice of medicine. He sees the patient in his own environment and learns for the first time that the patient is interested, not in a diagnosis, but in obtaining help.

The operation of the preceptorship system is very simple. It is administered by a committee of four operating directly from the Dean's office; three committee members come from the Faculty (two internists and one general practitioner), and one is an active preceptor who has been engaged in the program throughout. Students are sent to towns with populations not larger than 2,500, and to private practices containing at the most a partnership of two. There are now 70 physicians with Faculty appointments as preceptors in medicine. Preceptors are encouraged to adopt an individual approach to the problem of teaching. Preceptorships last for four and a half weeks, a period arrived at after careful thought. The student is expected to make all calls with his preceptor, to participate in hospital rounds, to take an active part in office routine and to be in constant attendance upon patients with his preceptor. The preceptor provides maintenance for the student, who usually lives in his teacher's home as a member of the family. Married students are allowed to bring their wives. Members of the preceptor committee make field trips several times a year to evaluate the program. The preceptor at the end of his period reports upon the student, while the student reports upon the quality and quantity of his experience. An indirect benefit of this has been to throw some unexpected light upon the scope of general practice in Kansas communities.

The preceptorship program has been considered an unqualified success by all parties. It must, of course, stand or fall by the character of the preceptor. After this experience, students mature medically and are also given a chance to see whether they would wish to become general practitioners or take up some other branch of medicine. Even if he does not become a general practitioner, the medical student is able to see the difficulties attending the general practice of medicine. Patient care in Kansas has improved as a result of this program. For one thing, a redistribution of physicians has taken place, so that there is now no community with a population of 1,000 or more without a physician. The trend from rural to urban practice has been reversed. Costs of the program have been very small.

Dr. Wescoe says that it now appears that comprehensive medicine may best be taught in a program developed around the person who truly provides it—the general practitioner in a small community.

MEDICO-LEGAL

WRONG FINGER

T. L. FISHER, M.D.,* *Ottawa*

IN JUNE 1954 a doctor reported that, at an operation to correct a "mallet finger" which resulted from an injury several months earlier, he had operated on the wrong finger. Two fingers had been injured but only one required operation. The afternoon after the operation the surgeon's resident telephoned to report that the surgeon had operated on the middle instead of the ring finger. The doctor's report of the incident allowed the inference that he had depended on someone else to know which finger actually was to be done. "The resident and intern were both very familiar with this case and I find it difficult to see how they could let me go ahead."

It was fortunate in this case that the surgery done was of a kind that produced little damage. The patient consented to having the proper finger repaired and this was done with a good result. Nevertheless a claim, a fair claim, was made. It was agreed that a settlement of $335 should be arranged. This was done, appropriate releases were obtained and the case settled.

These are difficult cases to discuss because nothing can be said in the doctors' defence. The Canadian Medical Protective Association has come to know of cases where wrong fingers have been amputated, wrong legs operated on, herniotomies done on the wrong side and—wrong patients operated on!

Mistakes of this kind comprise a very tiny, an infinitesimal proportion of the large number of surgical operations being done. It probably is true that as long as doctors are human—and most of them are—some mistakes are unavoidable. But it does seem as if mistakes like these are mistakes which are not unavoidable and which cannot be excused—are mistakes which could not occur if rudimentary precautions were taken. Surgeons, more than anyone else, know the precautions that will obviate such accidents and these need not be detailed here. The simplest and the most obvious precaution is to identify each patient before beginning surgery. Another, equally simple and obvious, is to make notes, to make them at the patient's bedside when the patient can correct any errors, and to look at the notes before beginning to operate and to be sure the part being operated on is that mentioned in the note.

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*Secretary-Treasurer, Canadian Medical Protective Association.

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JUDGMENT IN COLUMBUS PLAN CASE

IT WILL BE RECALLED that three medical practitioners in London, Ontario, on the staff of the Victoria Hospital, London, brought suit against the Board of Trustees of the Victoria Hospital and the remainder of the medical staff, seeking to show that the by-laws of the medical staff, in particular as they referred to the Columbus Plan, were *ultra vires*, invalid and of no force or effect. On August 23, 1956, Mr. Justice LeBel (Supreme Court of Ontario) delivered his judgment after a hearing. The salient points from the judgment are reprinted below, because of their wide interest to the medical profession.

Mr. Justice LeBel said:

"Both the general by-laws and the Columbus Plan by-law were duly approved by the Lieutenant-Governor in Council as the 'by-laws of the hospital', as required by section 9 of The Public Hospitals Act, R.S.O. 1950, Chapter 307.

"The plaintiffs' real objections are to the provisions which deal with the practice of dividing fees, or 'fee-splitting' as it is called in the medical profession, and the Columbus Plan by-law which I was told originated in the United States, is wholly concerned with that practice. And while paragraph 4, the final paragraph of the by-law, professes to repeal, and if the by-law is valid, does repeal, 'the medical staff by-laws and the regulations in force . . . so far as the same are inconsistent with this by-law', I think that it is advisable to set forth the provisions objected to in the general by-laws as well as the three main paragraphs of the Columbus Plan by-law.

"Section (e) of the general by-laws under the heading 'Privileges of the Hospital' provides:

" '(e) It shall be the duty of the Medical Executive Committee to consider information which might come to its attention regarding fee-splitting. No medical practitioner who is a member of the Staff of the Hospital shall give to or receive from any practitioner any part of the fees received from a patient unless the division of such fee is clearly indicated on the account rendered the patient.

" 'In the event of reported fee-splitting, it shall be the duty of the Medical Executive Committee to pass to the Board of Trustees recommendations for action. The Board of Trustees shall take such action as is deemed necessary and may deny the privileges of the Hospital to such physicians or surgeons if the Medical Executive Committee has so recommended, or concurred.

" 'All matters of discipline involving the Medical Staff shall be dealt with finally by the Board of Trustees. This is to include all reported cases of fee-splitting.'

"According to the general by-laws the Medical Executive Committee consists of the President and six elected members of the Medical Staff. It is declared to be a liaison group between that staff and the Board of Trustees.

"Paragraphs 1, 2 and 3 of the Columbus Plan by-law read as follows:

" '1. A physician or surgeon who is privileged to attend patients in, and/or who uses the facilities of, Victoria Hospital, shall not receive from or pay to another physician or surgeon, either directly or indirectly, any part of a fee received for professional services, to the intent that all fees shall be collected and retained by the individual physician or surgeon commensurate with the value of professional services rendered by him or her. This prohibition shall not, however, apply or extend to physicians or surgeons in partnership by contract or under articles of employment.

" '2. All books of accounts of such physician or surgeon shall be open for inspection at any time, but not less frequently than once each calendar year, to an auditor appointed for the purpose by the Board of Trustees, who shall report to the Board of Trustees, or to such person or committee as it may from time to time designate, and such report shall only indicate whether or not such physician or surgeon has complied with the provisions of this by-law. With respect to the surgical staff, and for the purposes of this by-law, the Board of Trustees may authorize such further enquiries as may be deemed necessary.

" '3. If it is reported that such physician or surgeon has not complied with the provisions of this by-law, the Board of Trustees may deny the privileges of attending patients in and/or the use of the facilities of Victoria Hospital to such physician or surgeon.'

"It will have been noticed that whereas the general by-laws permit fee-splitting 'if the division of such fee is clearly indicated on the account rendered the patient', the Columbus Plan by-law prohibits the practice altogether. The qualified exception in the earlier by-laws probably stems from the following passage taken from the former Code of Ethics of the Canadian Medical Association, revised and adopted on June 21, 1938, under the heading 'Secret Commissions':

" 'A secret arrangement between two physicians whereby unknown to the patient, one physician receives part of the fee paid to the other, is not consistent with the honour of the profession. Such a practice is dishonest and leads to trafficking in patients. . . .

" 'Occasions may arise when the complexity or obscurity of an illness demands the services of physicians practising in different fields of medicine; in such a case a composite fee may be arranged and distributed. Provided the patient is aware of this arrangement, the division of the composite fee does not conflict with the ethics of the profession.'

"However, the exception in favour of 'a composite fee' does not appear in the Association's new Code of Ethics, adopted in June 1954. The present provision reads:

" 'The only basis on which a fee may be charged to a patient, or on which money may be received by any medical practitioner, is that of work actually done for the patient, and such patient must receive a direct statement from the medical practitioner concerned. Any other arrangement between two or more medical practitioners, whereby one receives part of the fee paid to the other practitioner, is unethical and may contribute to dishonesty.

" 'In cases where in the opinion of the attending medical practitioner the services of one or more consultants are required, each such consultant shall render his account and submit his receipt individually.'

"In any event, the qualified exception contained in the general by-laws must be deemed to have been eliminated by paragraph 4 of the Columbus Plan by-law if that by-law is valid.

"Without further delay it should be said, and repeated for the sake of emphasis, that the plaintiffs and a group of medical practitioners they represent, do not say they favour the practice of fee-splitting; in fact no one was heard by me to say a kind word in favour of the practice. Their real objections, their counsel say, are to the terms of the Columbus Plan by-law which give the Board's auditor the right to inspect a medical practitioner's books and the Board itself the right 'to deny the privileges of attending patients in and/or the use of the facilities of Victoria Hospital'. And these objections appear to be based upon a conviction expressed best, perhaps, in a letter written by the Executive Secretary of the Ontario Medical Association concerning the Columbus Plan by-law.

" 'While paragraph one of the by-law, dealing with the division of fees, is compatible with the Code of Ethics of the Canadian Medical Association (of which the Ontario Medical Association is a Division), the Executive feels that in Ontario any disciplinary action taken in that regard should be in the hands of the body established under the Medical Act for that purpose, namely, the College of Physicians and Surgeons of Ontario. The Executive feels that it is highly undesirable to place disciplinary power pertaining to the ethics of a professional group in the hands of a lay board.'

"The Board must be taken to have been influenced by sound considerations in taking the action it did. A consideration of the training facilities provided by Victoria Hospital for the Faculty of Medicine of the University of Western Ontario must have been very much in the minds of the Board. And Dr. Robert Janes, President of the Royal College of Physicians and Surgeons, Canada, testified that the College would withhold its approval of Victoria Hospital for the training of physicians and surgeons if that hospital approved of the practice of fee-splitting.

"And Dr. George E. Hall, President of the University of Western Ontario, swore that the practice was a matter of great concern to the University and to the Joint Relations Committee set up under the said Agreement. The practice was morally and ethically wrong, he thought. Furthermore, the certificate issued to Victoria Hospital on December 5, 1953, by the Joint Committee on Accreditation of Hospitals of the United States and Canada contains a clear pronouncement against the practice. It reads:

" 'THAT membership upon the medical staff be restricted to physicians and surgeons who are . . . (c) worthy in character and in matters of professional ethics; that in this latter connection the practice of the division of fees, under any guise whatsoever, be prohibited.'

"It is, of course, vital to any hospital that it retain its accreditation and this is especially true where the hospital is engaged, in association with one of our foremost universities, in educating young men and women for membership in the great medical profession. No education is worth the name, certainly, if it is not based upon sound moral principles. But whether fee-splitting is simply immoral or unethical or both, on the one hand, or illegal, as Mr. Robinette argues, on the other, the practice raised a real problem, and the Board had to deal with it. The question is whether in attempting to do so it has exceeded its powers, as counsel for the plaintiffs stoutly maintains.

"In considering the question it is necessary at the outset to refer to one of Mr. Williston's contentions which he says is basic—as it is, undoubtedly. He argues that the by-laws, particularly the Columbus Plan by-law, can be invoked to deny the privileges of the hospital to any and all medical practitioners who are entitled by law to practise medicine in Ontario. The by-laws, or at least the disputed provisions in them, go too far, he says, because the Board has no jurisdiction over the medical profession as such, and hence no right to discipline a physician or a surgeon. But the general by-laws clearly apply only to medical practitioners who are members of the medical staff of the hospital and the recital to the Columbus Plan by-law is to the same effect.

Mr. Justice LeBel quoted material to show that all persons making use of a hospital should conform to its by-laws and regulations. He then turned to the powers of the Board of Trustees of Victoria Hospital as regards functions of the medical staff, and in particular to the authority of the Board to discipline recalcitrant staff members. He pointed out that by regulations made under The Public Hospitals Act, May 29, 1952, "A hospital shall be governed by a board elected or appointed in accordance with the provisions of the authority, whereby the hospital is created, established or incorporated."

He then quoted specific portions of the City of London Act, 1954:

" '1.—(1) The general management, operation, equipment and control of the hospitals of the City of London known as Victoria Hospital, London, and War Memorial Children's Hospital of the City of London are vested in and shall be exercised by a board called The Board of Hospital Trustees of the City of London; . . .'

"The force of the broad powers implicit in the words 'govern' and 'manage' and 'control' is recognized by Mr. Williston but he contends that they do not authorize a Board to prohibit medical practitioners from using the facilities of the hospital, and he cites the well-know case of *Toronto v. Virgo*, (1896) A.C. at 88, and others, in support of his contention. The headnote in that case reads:

" 'statutory power conferred upon a municipal council to make by-laws for regulating and governing a trade does not, in the absence of an express power of prohibition, authorize the making it unlawful to carry on a lawful trade in a lawful manner.'

"With respect, I do not think this principle is in point here. Moreover, the Board has not prohibited anyone from practising his profession in Victoria Hospital so far as I am aware. When it does, if ever, the legality of that action can be tested then. What it has done by the Columbus Plan by-law is say in effect to all members and prospective members of its medical staff: 'You will be entitled to the privilege of using the hospital but the privilege is subject to two conditions: first, you must not split or divide fees, and second, you must permit our auditor to inspect your books so that we may make reasonably sure that you do not. Unless you agree to be bound by these conditions, you cannot be a member of our medical staff and you must forego such privileges and uses of the hospital as membership in that staff entails.' That is a positive action on the part of the Board, certainly, but it is regulatory, not prohibitive. Unless the Board can speak in that manner to the members of its medical staff it cannot govern, manage and control the hospital entrusted to its care, in my opinion. Nothing was to be gained by simply enacting a by-law declaring that the Board considered the practice of fee-splitting in any guise unethical. That had been done in principle already by the Canadian Medical Association, as I have shown. Accordingly, it must have been felt that the new by-law needed to have teeth in it. The members of the medical staff had to be disciplined where necessary, or the evil could not be combated. After all, and this fact must be emphasized, no one was, or is, required to seek appointment to the medical staff of Victoria Hospital.

"The principle is well established that a statutory power to pass by-laws carries with it the implied power to impose reasonable penalties for their infraction; otherwise the by-laws would be largely nugatory.

"For the reasons stated I am satisfied that the Columbus Plan by-law is valid and binding upon the members of the medical staff of Victoria Hospital and hence that the exception contained in the general by-laws in favour of a division of the fees if the same is clearly indicated on an account rendered the patient, has been effectively repealed. In all other respects the general by-laws are also valid and binding.

"Before concluding I think I should say something concerning the legal nature of the problem that was dealt with by the Board even though I appreciate that my reflections upon the subject are unnecessary in view of the decision just reached. The question raised is whether medical men who secretly divide or split fees are guilty of conduct which is merely unethical under

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the Code of Ethics of the Canadian Medical Association or more serious from a legal standpoint. I am satisfied that such conduct is considerably more serious.

"The physician or surgeon is a professional adviser as The Medical Act, R.S.O. 1950, Cap. 288, particularly sections 40 and 52, makes plain. And the Code of Ethics of his profession forcefully reminds him of the magnitude of his duty in that regard, for on page 4 of the booklet we find Francis Bacon's famous admonition to all advisers:

" 'The greatest trust between man and man is the trust of giving counsel.'

"The legal relationship between a patient and his physician or surgeon has been touched upon in only a few cases, but it is clearly established in them that it is fiduciary and confidential. It is the same relationship as that which exists in equity between a parent and his child, a man and his wife, an attorney and his client, a confessor and his penitent and a guardian and his ward.

"*Kenny v. Lockward,* (1932) O.R. 141, a fairly recent Ontario case, was concerned with the relationship of physician and patient. At p. 155 the Court of Appeal, per Hodgins, J.A., said:

" 'The relationship of surgeon and patient is naturally one in which trust and confidence must be placed in the surgeon. His knowledge, skill and experience are not and cannot be known to the patient.'

"And again at p. 157:

" '. . . if the party has put himself in a fiduciary position, that position "imposes on him the duty of making a full, and not a misleading disclosure, of facts known to him when advising . . ." '

"The medical practitioner, like the lawyer or other professional adviser, is bound, then, to see to it that in no circumstance will he allow his professional duty to come into conflict with his personal interests. And when a patient consults his physician he is entitled in equity, to assume that this adviser has no pecuniary interest in the surgical operation he advises or in the choice of the surgeon or in the amount of the proposed surgeon's fee. If the medical adviser has a pecuniary interest—and a fee-splitting arrangement is such an interest—he must disclose it or fail in the discharge of his duty to his patient, and by failing in that way, he acts illegally, in my opinion.

"His conduct does not amount to a crime under the provisions of The Criminal Code of Canada, it is true, but it is illegal none the less. And I am unable to see how the provision of the general by-laws which required the physician to disclose the arrangement to his patient *after the event* removed the illegality.

"Undoubtedly, on learning about a secret arrangement of this nature the patient can withhold the rebateable portion of the surgeon's fee. And in the case he has paid his physician's account before becoming aware of the true situation, both the physician and the surgeon are liable to him for the return of the amount of the surgeon's rebate. Furthermore, the practice is dangerous from the standpoint of medical practitioners. To take but one example: Where the advisability of surgery, already performed, has been brought into question, as it is on occasion, proof of the existence of fee-splitting between the medical men involved might well tip the scales in favour of one like the plaintiff in the *Kenny* case, who claimed damages for loss of health consequent upon an alleged ill-advised operation. But apart from surgery, the same principles apply, in my view, where a patient is referred by one medical practitioner to another for the reason that the other specializes or holds himself out to be better trained or practised in some branch of medicine . . .

"In the result and for the reasons mentioned earlier, the plaintiffs' action for the declaration sought, fails and is hereby dismissed with costs.

"A. M. LEBEL."

Association Notes

THE ANNUAL MEETING, 1959

Although the British Medical Association has met with the Canadian Medical Association in Canada four times, 1959 will represent the first occurrence of the Annual Meeting of the C.M.A. in the United Kingdom. The Conjoint Annual Meeting in Edinburgh, July 16-24, 1959, is a special occasion which will serve to strengthen the ties of friendship with our British colleagues which were so evident at the joint meeting in this country in 1955.

Since it is anticipated that many Canadian doctors and their wives will wish to attend, it is not too early to consider travelling plans. The movement of large numbers at the height of the tourist season requires expert organization and the Association has appointed University Tours Limited, 2 College Street, Toronto, as official travel agents.

University Tours Limited can legitimately claim to operate the most complete all-Canadian travel service. In addition to their own activities, they are general agents for Frames' Tours Limited of London, the largest privately owned travel company in the British Isles. They are North American general agents for Fourways Travel Limited of London, one of the largest British operators of luxury motor coach tours, and for Steiner's (Car Hire) of Liverpool. As adjuncts to its Canadian headquarters, University Tours also maintains offices at 80 Southampton Row, London, W.C.2, and 4 rue Daunou, Paris. The President of University Tours Ltd., Mr. Kenneth B. Conn, has already conferred with the sea and air carriers and has met on two occasions with officials of the B.M.A. in London.

For these reasons University Tours Ltd. has been chosen as the official travel agent of the C.M.A. and will be prepared to handle all details of travel, tours, independent travel, coach tours and car hire. The only facet of the Edinburgh movement which will not be handled by University Tours relates to housing accommodation in Edinburgh.

This important matter must necessarily be under the exclusive control of the Housing Committee of the B.M.A. It is anticipated that all hotel accommodation in the city will be overtaxed for the period July 16-24, 1959, and arrangements are being made to accommodate many Canadian visitors in the homes of Edinburgh colleagues. The first two days of B.M.A.-C.M.A. week will be occupied by the meeting of the Representative Body of the B.M.A. and the week of Saturday, July 18 to Saturday, July 25 represents the period of greatest interest to C.M.A. members and best suits the arrangements of our local hosts.

INFORMATION FORM

NAME.....

ADDRESS.....

I shall be accompanied by.....

(If any children please state their sex and present age) .....
.....

I prefer to travel by ship .....
by air ..... (a) regular schedule
..... (b) charter flight

I prefer to travel First Class .....
Tourist Class .....
Cabin Class .....

Ships from Canada have only two classes (First and Tourist). Ships from New York also carry Cabin Class.

I prefer to leave from Montreal .....
Quebec .....
New York .....

In addition to Edinburgh, I wish to visit the following :

England	Russia	Portugal	Germany
Holland	Hungary	Denmark	France
Switzerland	Ireland	Czechoslovakia	Norway
Spain	Belgium	Yugoslavia	Finland
Sweden	Italy	Scotland	Austria

I wish to travel on a conducted tour. Yes..... No .....

I prefer independent, arranged travel. Yes..... No .....

I wish to rent a self-drive car. Yes..... No .....

I wish to travel by chauffeur-driven car. Yes..... No .....

I wish to travel on motor coach tours. Yes..... No .....

I expect to be absent from Canada for ..... weeks.

I prefer to arrange my tour in advance of the Edinburgh meeting .....
after the Edinburgh meeting .....

I understand that accommodation in Edinburgh will be available, Saturday, July 18 to Saturday, July 25.
I am prepared to accept the housing assigned by the B.M.A. Committee in hotel or doctor's residence .....

I wish to leave Canada in April .....
May .....
June .....
July .....

I wish to return to Canada in July .....
August .....
September.....
October .....

I wish the following class of land travel. De luxe .....
Standard .....
Thrift .....

On De luxe travel, rooms have private baths throughout—hotels are all de luxe and first-class.
On Standard travel, rooms have private baths wherever available—hotels are all first-class.
On Thrift travel, small, comfortable, specially chosen hotels are used. Rooms do not generally have private baths.

My local travel agent is .....
.....

IT IS CLEARLY UNDERSTOOD THAT THE COMPLETION OF THIS FORM IN NO WAY BINDS ANY MEMBER OF THE CANADIAN MEDICAL ASSOCIATION

Please complete and return this form to :

UNIVERSITY TOURS LIMITED,
2 College Street,
Toronto.

University Tours Ltd. will work closely with local travel agents in every community in Canada and suitable business arrangements are assured. It is important that the intention of every C.M.A. member to attend be communicated to University Tours, as both B.M.A. and C.M.A. will thereby be notified of your plans and timetable.

Tentative plans have been made to provide the following basic conducted tours at advantageous rates:

1. British Isles, Holland, Belgium, Germany, Switzerland and France.
2. British Isles, Holland, Belgium, Germany, Switzerland, Italy and France.
3. British Isles, Holland, Belgium, Germany, Switzerland, Austria, Yugoslavia, Italy and France.
4. British Isles, France, Spain and Portugal.
5. British Isles, Norway, Sweden, Denmark, Germany, Holland, Belgium and France.

In addition to these basic tours, any specified combination of European visits may be arranged —foreign independent travel, motor coach tours, car hire, both self-drive and chauffeur-driven and all combinations of these facilities.

Since a movement of this size requires extensive preparation, all members who are considering attending the Edinburgh meeting are requested to complete and return the information sheet which appears herewith.

CORRESPONDENCE

PREVENTION AND CORRECTION OF DEFORMITY IN RHEUMATOID ARTHRITIS

To the Editor:

I commend Dr. Swanson for emphasizing a most important and neglected aspect of treatment of the rheumatoid arthritis patient in his article in the August 15 issue of the Journal. As I have used the methods of treatment presented for over 20 years, I would like to discuss some of the features mentioned, and offer a few practical suggestions.

1. It was stated that the first indication for a splint is "when a joint is acutely and painfully swollen". I believe splinting is indicated for almost every painful joint (or group of joints, as in the spine), acute or chronic, and whether or not swelling is present. Also, I believe that intermittent splinting of the painful joints is the most valuable single agent in local treatment, for reduction of pain, spasm and fatigue, and the prevention of deformities. In the illustrative case of the 16-year-old boy, if splints had been applied immediately, instead of after five weeks, he might have been spared considerable unnecessary suffering.

2. It was stated in the article that there "probably are two factors concerned in the production of joint deformity, . . . destruction of the articular structure . . . and muscle spasm . . .", along with the atrophy. To these I would add the following: (a) The force of gravity: in the hands, tending to produce ulnar deviation; and in the knees tending to posterior luxation of the tibia, particularly if pillows are used cross-wise under the knees. (b) The downward push of tight or heavy bedclothes on the feet, tending to flexion deformities, and foot-drop. (c) Excessive "physiotherapy" and physical activity that forces the involved joints "to keep going", thus causing more pain and more spasm.

3. The hypothesis "suggested" to explain the production of joint deformity, viz. pain, causing protective muscle spasm which then leads to contracture deformities, is by no means new. I first learned it in 1933 from a group of orthopædic surgeons in Boston, Dr. Loring T. Swaim and staff of the Robert Brigham Hospital. From them I also learned this procedure of overcoming contracture deformities by using successive splints, with decreasing angulations as the deformity decreased. For those who may be interested, this method and technique of making and using splints (as well as the above-mentioned theory of spasm causing deformities), are presented with illustrations in the early editions of Comroe's book, "Arthritis" (Lea and Febiger, Philadelphia), in much greater detail than is possible in a single article. Incidentally, I have given numerous lectures on this theory and method of treatment during the past 20 years.

4. I personally have made over 6,000 splints and supports of various kinds, for various types of arthritic and rheumatic conditions, and on the basis of that experience I must say I am forced to differ somewhat with some of the other views and procedures mentioned in Dr. Swanson's article.

(1) Technique: His "non-padded, skin-tight plaster-of-paris splint" (as made for Case 2) is apt to become cold and clammy at times, and does not allow for any joint swelling that may recur. I always line every splint with a light padding, for comfort; cover the splint with stockinet—which is removable for washing, and incidentally obviates the need for any fancy colouring—and allow a little extra space for possible swellings, and also at the pressure points. For leg-and-foot I extend the splint well beyond the toes to protect the foot from pressure of bedclothes and from foot-drop, and put a small cross-bar under the heel to hold the splint upright without requiring effort from the patient; a foot-rest is provided when the feet are out of the splints. Lightness in a splint can be achieved by "roping" the plaster bandage; and by "latticing" (a method I have developed during the past few years). When there is not too much flexion deformity I make splints for the knee, ankle (and foot), hand (and wrist), and elbow, out of aluminium; these splints are light, and have the added advantage of being adjustable.

(2) The "banjo-splint", for intermittent traction to the fingers, apparently used previously in Case 3, I think should not be condemned, because when used properly it has proven to be of real value in helping to overcome deformities, without discomfort to the patient.

(3) Method of use. It was stated that "it is customary to leave the joint immobilized (in the splint) for from four to 14 days . . . or even longer periods, in exceptional cases." In Case 1 the legs were immobilized for three weeks; in Case 2 the knee for seven days; and in Case 3 the hand for ten days. I believe these long periods of initial immobilization are unnecessary, and are too risky in most circumstances. I can recall seeing several rheumatoid arthritis patients in recent years who had had splints applied continuously for a few weeks, resulting in ankylosis of the joints; and at least two of these patients received that treatment in the public wards of large teaching hospitals. I believe that one to three days of immobilization is usually sufficient at first, and thereafter the affected joints should be removed from the splints every one or two days for gentle passive movements, along with other measures of treatment. Incidentally, the making of splints can be, as it is with me, an office or home procedure, using ordinary plaster-of-paris rolls; and I believe they should be used by every practitioner who treats patients with arthritis, of any or all types. Correct intermittent splint-

ing requires less "physiotherapy" and less medication, and results in less pain, less deformity, and less disability.

(4) "Physiotherapy" (usually meaning heat, massage, and exercises) has been stressed in the treatment of these cases, and rightly so in patients whose arthritis is sufficiently severe to warrant hospitalization. However, I believe that formal physiotherapy is frequently overdone, and often too strenuous, because gentleness should be the keynote throughout. In my experience, the vast majority of arthritic patients can get all the physiotherapy they need at home, once the regimen has been established, and it can be carried out successfully under the supervision of the family doctor.

(5) As a physician I heartily endorse the conservative (medical) method of preventing and correcting deformities, as presented. However, I think it is worthy of mention that manipulation under anæsthesia occasionally is advisable, and surgery at times may be necessary, as a last resort, in overcoming deformities.

(6) In the conclusion it was stated that splints are an "often essential part of the treatment of rheumatoid arthritis." I believe that intermittent splinting is *always* indicated, as the essential basis of the local treatment in rheumatoid arthritis, as well as in other types. Also I believe that any patient who does not have the benefit of protective splinting is not getting the best that can be offered in treatment, with or without the use of the newer pain-killing drugs.

After using the method of treatment as presented, for over 20 years, I find it interesting to see someone else finally embrace this form of therapy, with such obvious enthusiasm, and especially one who has a university appointment. I believe that if medical teaching gave more emphasis to the proper use of splinting in the treatment of arthritis, as exemplified in this article (with some modifications as noted herein), there would be a tremendous reduction in the number of crippling deformities, and much of the tragedy would be averted.

Medical Arts Bldg., G. DOUGLAS TAYLOR, M.D.
Toronto, Ont.,
September 20, 1956.

ANÆSTHETIC PREMEDICATION

To the Editor:

The recent discussion of anæsthesia premedication in the columns of this Journal accentuates a problem which deserves critical appraisal by the physicians who must care for a patient requiring surgical correction of disease. The statements made by some, such as Dr. F. B. Bowman, reveal that those who in the past administered the anæsthetic and also performed the operation either think they provided a higher level of medical care and attention, or else were far more concerned with their particular surgical handiwork to have elicited or recognized the occurrence of such hazards as post-spinal headache. Perhaps Dr. Bowman recognized the need for meticulous technique, the use of fine-gauge needles in administering spinal anæsthesia, and the necessity for constant vigilance over physiological parameters of his patients. Even if the number of operations he so performed was very large, it is no doubt fortuitous that no headaches or other complications of spinal anæsthesia were encountered. It is indeed unfortunate that the letter lacks constructive criticism of modern anæsthetic practice by one who has had 20 years of experience in these matters.

Even before anæsthetists and anæsthesiologists had been certified and had become plentiful, the feeling began to develop that so-called premedication should really begin when the surgeon first informs the patient that an operation is necessary. Premedication should not merely mean the administration of drugs, because drugs alone are never predictable enough to produce the effects that the anæsthetist desires with what he calls premedication. Since the anæsthetist is usually not aware of an impending operation on a patient until the day before (when the list appears), he cannot be expected to perform a detailed psychological and physiological assessment and institute psychotherapy in the brief time available. Reliance on pharmacological agents has therefore developed into the anæsthetist's sheet anchor for providing psychological tranquillity.

The greatest efforts must now be directed towards careful selection from a wide range of drugs now available in order to produce adequate psychic sedation, to cause amnesia for the patient who presents an unstable mental attitude, to abolish reflexes of a noxious nature and to prevent undesirable physiological disturbances of homœostasis which may be caused by the anæsthetic agents, the patient's disease state, by previous drug therapy, or by the surgeon's operative procedure or technique.

It behooves the anæsthetist to carefully select the drugs and their dosage for each of his patients, with primary consideration of the mental state, the diseases present and the contemplated operation. This requires a detailed knowledge of the pharmacological and physiological effects of each drug and each combination of drugs he employs. Without such knowledge, the clinical anæsthetist invites criticism, and perhaps unnecessary morbidity in the surgical patient.

University Hospital, ALLEN B. DOBKIN, M.D.
Saskatoon, Sask.,
October 10, 1956.

TUBERCULOUS MENINGITIS: COMBINED CORTICOSTEROID AND ANTIMICROBIAL THERAPY

To the Editor:

In this paper, which appeared in the October 15 issue of the Journal (p. 631), I neglected to give credit to the Federal Department of National Health and Welfare for providing the funds for the purchase of cortisone, hydrocortisone and prednisone, during the last three years of this study.

This is, of course, a serious error, since that Department generously supplied several thousands of dollars for this purpose, through a Federal Research Grant.

Your kindness in rectifying this error on my part will be deeply appreciated.

S. J. SHANE, M.D.,
Medical Superintendent.

Point Edward Hospital,
Sydney, N.S.,
October 22, 1956.

WORLD MEDICAL ASSOCIATION

SECOND WORLD CONFERENCE ON MEDICAL EDUCATION

The Program Committee of the Second World Conference on Medical Education announces the following plans for the convening of this Conference:

Place: Chicago, Illinois.

Dates: August 30-September 4, 1959.

Theme: Medicine—Life-long Study.

A conference on the continuing education of the doctor after graduation from undergraduate medical schools.

Objective: Exchange of information for the purpose of assisting in raising the standards of medical education of the world.

Officers' Names: Dr. Raymond B. Allen, Chancellor, University of California in Los Angeles.
Deputy President—Dr. Victor Johnson, Director of the Mayo Foundation for Medical Education and Research, University of Minnesota Graduate School.

Officers to be Named: Vice-Presidents and Assistant Vice-Presidents—one of each to be named from different countries in each of the following areas of the world: Asia; Europe; Latin America; and Pacific.
Rapporteurs: One for each section to be named from the United States and Canada.

CONFERENCE FORMAT

First Day—Plenary Session to include speakers to review the First Conference on Medical Education (London, 1953) and tie the two conferences together.

Second, Third and Fourth Days—Sectional Meetings.
Section I—Basic Clinical Training for all Doctors.
Section II—Advanced Clinical Training for General and Specialty Practice.
Section III—Training for Research and Teaching.
Section IV—Continuation Medical Education.

Last Day—Plenary Session.

Languages—English, French and Spanish. German to be added if indicated and feasible.

The Second World Conference on Medical Education will be convened under the auspices of the World Medical Association with the collaboration of the World Health Organization and the International Association of Universities. National medical associations and medical schools of the world are invited to assist in planning this conference; recommending topics and well-qualified speakers to participate; sending representatives to attend, and providing publicity relative to it.

ABSTRACTS *from current literature*

MEDICINE

Observations on the Individual Effects of Smoking on the Blood Pressure, Heart Rate, Stroke Volume and Cardiac Output of Healthy Young Adults.

C. B. THOMAS *et al.*: *Ann. Int. Med.*, 44: 874, 1956.

The effects of smoking upon the systolic pressure, diastolic pressure, pulse pressure, heart rate, stroke volume (as determined by the ballistocardiograph), cardiac output and cardiac index were measured in 113 healthy medical students.

Statistically significant changes occurred in all measurements following the smoking of one cigarette, as follows: (1) Systolic blood pressure rose in both women and men, more in the former. (2) There was a narrowing of the pulse pressure, more marked in men than in women. (3) No significant differences were to be found between smokers and non-smokers with regard to the above changes. (4) Subjects whose parents suffered from hypertension showed a greater increase in cardiac output and cardiac index than did subjects with negative parents. (5) Subjects with parental coronary artery disease showed a much smaller increase in cardiac output and cardiac index than did subjects whose parents had no such disease.

These results emphasize the fact that there is no universal pattern of circulatory response to smoking. The over-all effect of tobacco appears to be somewhat individual, with surprising variations even in such a relatively homogeneous group as healthy medical students. Conspicuous differences in both the direction and the degree of change after smoking one cigarette were found in all the variables studied.

Cigarette smoking apparently results in marked changes in cardiovascular physiology. However, these changes do not appear predictable, although certain trends can be discerned in the offspring of individuals with hypertension and coronary artery disease. It does not yet appear possible to assess the significance of these findings. S. J. SHANE

Lack of Effect of Ingested Ferrous Sulfate on the Guaiac Test for Occult Blood in the Stool.

J. C. HARVEY: *Am. J. M. Sc.*, 232: 17, 1956.

The reliability of the test for occult blood in the stools using gum guaiac was established by:

1. Well-controlled observations made upon the stools of normal patients, a patient with a bleeding ulcer, 116 students and 2 patients who took iron orally, and upon the stool of a subject on a diet high in rare meat.
2. Ferrous sulfate ingested orally, though giving a black or tarry colour to the stools, does not give a positive reaction with the gum guaiac test for occult blood.
3. The amount of blood contained in the stools of a patient who ingests an average portion of rare meat does not give a positive reaction to gum guaiac. S. J. SHANE

Acute and Chronic Pulmonary Infection with Friedländer's Bacillus.

B. M. LIMSON, M. J. ROMANSKY AND J. G. SHEA: *Ann. Int. Med.*, 44: 1070, 1956.

During a two and one-half year period, 22 patients with acute and chronic pulmonary infection with Friedländer's bacillus were treated. Nine of the 13 patients with acute Friedländer's pneumonia died. One of the 9 in the chronic group died.

In vitro sensitivity tests reveal Friedländer's bacillus to be generally sensitive to the tetracycline group, chloramphenicol and streptomycin. A combination of streptomycin and one of the tetracycline group or chloramphenicol may be the treatment of choice in acute Friedländer's pneumonia, and immediate therapy should be initiated on the slightest suspicion of this condition. S. J. SHANE

A Medical Appraisal of Transaortic Commissurotomy.

J. F. URICCHIO *et al.*: *Ann. Int. Med.*, 44: 844, 1956.

Transventricular aortic commissurotomy has constituted a reasonably satisfactory technique in the treatment of aortic stenosis since 1950. An initial appraisal of the results of this operation in 79 patients concluded that the technique relieved aortic obstruction and provided clinical improvement in the large majority of patients who did not obtain equal benefit under carefully regulated medical routines. However, there was an immediate operative mortality of 18%, and the disturbing possibility of producing significant aortic regurgitation (7% of the survivors). To avoid these patent weaknesses and their unfavourable consequences, the operation of transaortic commissurotomy was developed. This procedure avoids myocardial injury by permitting the surgeon to enter the lumen of the aorta through an artificially created pouch, and to reach the valve without unusual blood loss in order to split the commissures under direct digital guidance. The present study analyzes the clinical experience with this technique in 40 patients operated on for significant rheumatic aortic stenosis, and compares the results with those of transventricular commissurotomy.

The 10% risk of death after transaortic commissurotomy is a distinct improvement over that in the transventricular approach, and compares favourably with the 8% death rate of mitral commissurotomy. However, this digitally controlled means of splitting the aortic commissural fusion did not prove an absolute safeguard against the hazard of producing significant aortic

regurgitation. Furthermore, it was found that the transaortic method does not extend the percentage of patients improved or the degree of their benefit.

It appears, therefore, that, from the standpoint of clinical results, there is little to choose between the two surgical procedures. However, the transaortic approach is to be preferred because of its lower surgical mortality.

The writers quote, from their own experience, the indications for and the contraindications to aortic commissurotomy. These are similar, more or less, to indications and contraindications in other cardiac surgical procedures. S. J. SHANE

Blood Pressure Studies Among American and Foreign-born Students.

N. SZENT-GYORGYI: *Circulation,* 14: 17, 1956.

The relation of hypertension to race, sex, environment, and geographic origin in a young adult population is analyzed. Of the 3,508 university students, 6.7% were hypertensive. Among American men and women the incidence was 8.1 and 3.1% respectively. The incidence of hypertension in all racial groups is significantly higher among American-born than among foreign-born males. *After 10 years of residence in the United States, foreign-born students have the same high incidence of hypertension as those born in the United States and Canada.* Detailed study is presented regarding the incidence of hypertension in different age groups among American and foreign-born white, Negro and Asian students.

S. J. SHANE

SURGERY

Direct Vision Correction of Calcific Aortic Stenosis by Means of a Pump-oxygenator and Retrograde Coronary Sinus Perfusion.

C. W. LILLEHEI *et al.*: *Dis. Chest,* 30: 123, 1956.

Blind or closed techniques for the correction of calcific aortic stenosis either through the left ventricle or the aorta have been encouraging but not altogether satisfactory. The failures or deaths have been from uncontrollable hæmorrhage, ventricular fibrillation, or the creation of aortic insufficiency. The successes have all too frequently been partial and incomplete.

A direct vision approach to the aortic valve utilizing the pump-oxygenator should lessen or obviate many of these complications. The twin obstacles to the direct vision approach to the aortic valve (interruption of the coronary artery circulation, coronary air embolism) can be prevented by a retrograde perfusion of oxygenated blood into the coronary sinus.

In a critically incapacitated 37-year-old woman this technique was applied to the correction, under direct vision, of a calcific aortic stenosis. Total cardiopulmonary by-pass was instituted by a pump and a simple disposable oxygenator. The aortic valve was exposed for 14 minutes through the opened aorta. During this interval the myocardium was maintained by the retrograde coronary sinus perfusion of a small quantity of oxygenated blood from the oxygenator. The heart remained a healthy pink colour and continued to beat at a slow regular rhythm throughout this interval. Recovery was uncomplicated and the patient's status postoperatively has improved dramatically. S. J. SHANE

Congenital Aortic Stenosis: Clinical Aspects and Surgical Treatment.

D. F. DOWNING: *Circulation,* 14: 188, 1956.

Clinical and physiological data of 37 patients with congenital aortic stenosis are presented. Fatigue, shortness of breath, and profuse perspiration were the commonest symptoms. Central nervous system manifestations and chest pain were infrequent. A systolic thrill and murmur in the second and third right interspaces were almost universal. Because they are rare at this site in other malformations, they are of great diagnostic significance. Right heart catheterization is very helpful in ruling out other lesions. Left heart catheterization is diagnostic if a gradient in systolic pressure across the valve is demonstrated. Differentiation of valvular from infundibular stenosis was not possible in this series.

Because of the danger of sudden death, relief of severe obstruction is mandatory. A satisfactory procedure is available for correction of valvular stenosis, involving dilatation of the narrowed orifice by an instrument inserted into the left ventricle.

Nineteen patients have been operated upon. There was one operative death and another died eight months later. One patient, with infundibular stenosis, is unimproved; one is symptomatically worse; one had no symptoms before surgery. The remaining 14 have experienced gratifying relief of symptoms. S. J. SHANE

Erythromycin as Prophylaxis in Pulmonary Resection.

M. LOPEZ-BELIO *et al.*: *J. Thoracic Surg.,* 32: 268, 1956.

Erythromycin was found to be an effective prophylactic agent against pyogenic empyema in pulmonary resection except when empyema was secondary to the development of a bronchopleural fistula. The effectiveness was dependent on the type of resection; the presence or absence of intrapleural catheters was the major factor. In the pneumonectomy group, effective concentration of the drug was found 48 hours after a 250 mg. intrapleural dose, and 72 hours after a dose of 400 mg., intrapleurally. The partial resection cases, however, had a more limited period of effective antibiotic coverage because approximately 50% of the drug was lost through the intrapleural catheters, during the first 3 hours. Thus, in the latter type of case, the intrapleural dose should be augmented by oral or intravenous administration, depending on the condition of the patient. In patients without bronchopleural fistula, erythromycin was felt to be effective in preventing empyema; but even in those cases of fistula and concomitant empyema, the drug is felt to be of value in improving general condition so that a further surgical procedure becomes feasible at an earlier time. The important factors necessary for the proper evaluation of antibiotics as prophylactic agents in pulmonary resection are considered to be the presence or absence of bronchopleural fistula, adequate local concentration of the drug, and sensitivity or resistance of the particular micro-organisms to the antibiotic under study. The role and importance of bronchopleural fistula in the development of empyema are discussed.

S. J. SHANE

Status of Fifty Patients Four and a Half to Seven Years After Mitral Commissurotomy.

O. H. JANTON, J. C. DAVILA AND R. P. GLOVER: *Circulation,* 14: 175, 1956.

The first 50 consecutive patients who underwent mitral commissurotomy approximately 4½ to 7 years ago have been subjected to a detailed analysis of their present subjective and objective status. Forty-one patients (82%) are living and form the basis for this report. The writers conclude that 29 patients (71% of those living or 58% of the original 50) are in better condition and living a more nearly normal life than they were prior to surgery. According to the 41 living patients and their family physicians, 36 (88% of those living, or 72% of the original 50) are better than they were before surgery.

No definitive conclusion can be reached regarding the present clinical status of these patients on the basis of their murmurs alone. Four of the 41 living patients have no murmurs. Eleven do not have their original mitral diastolic murmur. Fourteen have a mitral systolic murmur of varying degrees that was not present pre-

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operatively. Those patients with "pure" mitral stenosis obtain the best results from mitral commissurotomy.

Although the electrocardiographic changes after surgery do not regularly show conclusive evidence of improvement, a small group does show postoperative regression of right ventricular hypertrophy. By fluoroscopic and teleroentgenographic study, 10 (24%) of the 41 living patients have a smaller cardiac silhouette, 26 (63%) have a silhouette of the same size as preoperatively, and 5 (13%) have a larger cardiac silhouette. In 87% of these living patients the heart is the same size as or smaller than before surgery, whereas in the years preceding surgery it grew progressively larger.

The available cardiac catheterization data parallel and corroborate the observed functional state of the patient.

Twenty patients (49%) with valvular calcification have not been so greatly improved as 21 patients (51%) without calcification. Evidence of rheumatic activity was observed during the postoperative period in eight patients (19.5%). Valvular restenosis has not been observed in the 41 living patients or in those who died in the postoperative period.

Only one operative embolus was produced in 50 patients, and that patient has recovered almost completely. There have been no postoperative emboli, although the incidence before surgery was 12%.

This analysis establishes that commissurotomy confers a genuine, often dramatic, and usually persistent benefit to the patient. It confirms the original hope that this procedure would become a valuable adjunct in the over-all treatment of mitral stenosis. S. J. SHANE

Appraisal of Adenomatous Polyps of the Colon, Their Histopathology and Surgical Management.

H. F. BACON AND A. R. PEALE: *Ann. Surg.*, 144: 9, 1956.

The eradication of polypi of the large bowel is of the greatest importance, for they are unequivocally premalignant. In this report of 202 patients in whom the lesion was demonstrated by sigmoidoscope or radiologically, bleeding was the symptom in 70%. The ascending, transverse and descending colon was the site of the adenoma in 56 cases demonstrated by contrast barium enema and in eight cases demonstrated at laparotomy by an endoscope through a slit in the bowel. In 146 cases the lesion was in the sigmoid, of which 128 were visualized sigmoidoscopically, 108 reported by the radiologist and 33 additionally by endoscopy. In 33%, more than one polyp was found.

Criteria are suggested to aid in the decision about colon resection following excision and microscopic examination of the polyp. Coloscopy is advocated as a frequent procedure, to correct the 21% diagnostic error found in double contrast opaque enema with expert radiography.

The incidence of frank malignancy in this series was 3.4% and it is felt that polypectomy has a definite place in the management of adenomatous polyps.

BURNS PLEWES

RADIOLOGY

The Results of Radiotherapy of Bronchial Cancer.

L. H. GARLAND AND M. A. SISSON: *Radiology*, 67: 48, 1956.

In a series of 122 cases of bronchogenic carcinoma treated by roentgen therapy alone the authors found the average survival time (after treatment) to be 6.2 months. This was about three months longer than the average in a series of untreated cases. Two-thirds of the treated cases showed relief of symptoms for periods of weeks or months although marked improvement developed in only about 20%. While x-ray therapy achieved slightly better average results in anaplastic types of bronchial carcinoma, results were not predictable on histological grounds; some of the well-differentiated squamous-cell lesions responded better than some of the anaplastic tumours.

An extensive review of the literature is presented. There is no real evidence to date that supervoltage therapy is of any greater advantage than moderately heavy standard dosage. The authors recommend a tumour dose of about 3,000 r delivered in four weeks or less and feel that such therapy has a useful place in the palliative treatment of bronchogenic carcinoma.

NORMAN S. SKINNER

THERAPEUTICS

Comparison of Large and Small Doses of Hormones in Treatment of Acute Rheumatic Carditis.

S. B. ROY AND B. F. MASSELL: *Circulation*, 14: 44, 1956.

Of 160 rheumatic fever patients under the age of 17 years treated with variable doses of ACTH or cortisone for varying lengths of time, 88 patients were in their initial attack of rheumatic fever and had definite signs of carditis.

The frequency of complete disappearance of significant murmurs in 41 patients treated with relatively small doses of hormones was compared with that in 47 patients treated with relatively large doses of hormones. Results were related to the duration of illness prior to beginning of therapy.

In both the small-dose and the large-dose groups, the shorter the duration of illness prior to start of therapy the greater the frequency of disappearance of all significant murmurs. The frequency of disappearance of significant murmurs in the large-dose group was consistently greater than that in the small-dose group.

Data suggest that results of hormone therapy in rheumatic carditis are related to the time allowed to elapse before treatment is started, to the dosage of hormones, and to the duration of therapy. S. J. SHANE

Cycloserine Therapy in Tuberculosis in Humans.

W. LESTER, JR. *et al.*: *Am. Rev. Tuberc.*, 74: 121, 1956.

A series of 10 cases of pulmonary tuberculosis treated with 1.0 g. of cycloserine per day is reported. Clinical improvement was marked in all cases. Chest roentgenograms demonstrated improvement in 9 of the 10 patients, being marked in 2, moderate in 2, and mild in 5. No instances of progression of disease were noted during the course of therapy. Bacteriological studies revealed less satisfactory results, as the sputum cultures became negative for tubercle bacilli in only one patient; in only 3 patients did the sputum become negative on microscopy. Cycloserine resistance was gradually acquired, being demonstrable within 30 days after the initiation of therapy. In 2 patients, the resistance of the strains rose to probable limiting levels and in 4 patients it became significantly high. Epileptic seizures occurred in one patient while he was in acute respiratory failure; no other significant instances of toxicity were observed. It is concluded that cycloserine has a specific antituberculous effect, but that it should not be used as the sole agent in the treatment of tuberculosis. Further study is needed to evaluate the role of cycloserine in combined therapy with streptomycin and isoniazid. S. J. SHANE

OBSTETRICS AND GYNÆCOLOGY

Critical Evaluation of Biological Pregnancy Tests.

R. L. BERMAN: *Am. J. Obst. & Gynec.*, 72: 349, 1956.

The literature on biological pregnancy tests since 1928 is reviewed in this article and the Aschheim-Zondek (mouse) and Friedman-Lapham (rabbit) tests are briefly discussed. Male and female frog-toad tests and the Frank-Berman (rat) test and its proposed modifications are more fully reviewed. ROSS MITCHELL

OBITUARIES

DR. JACQUES BLAGDON, 38, died in Montreal on October 2. He graduated from the University of Montreal in 1944 and did postgraduate work in gynæcology and obstetrics at Jefferson Hospital in Philadelphia. He became gynæcologist at Notre-Dame Hospital in Montreal. Dr. Blagdon had been a fellow of the Royal College of Physicians and Surgeons of Canada since 1952, and a member of the Association of Obstetricians and Gynæcologists of Canada.

He is survived by his widow and two daughters.

DR. CHARLES BOISVERT, 59, died in the St. Sacrament Hospital, Quebec, on September 13. He graduated from Laval in 1926 and practised at Lac Megantic, Que.

Dr. Boisvert is survived by his widow.

DR. LOUIS GODBOUT, 48, a medical practitioner in Ville-Marie, Que., for 20 years, died in hospital on September 11 from injuries received in a car accident. Dr. Godbout graduated from Laval University in 1934.

He is survived by four children.

DR. DONALD MACDONALD died on August 4. He graduated in 1940 from Laval University and practised for 15 years in Baie-des-Sables, Que. He also studied cardiology in the Ste. Foy Veterans' Hospital, Quebec. He moved to St. Jerome, Que., in July 1956.

Dr. MacDonald is survived by his widow and five daughters.

DR. SAMUEL E. MOORE, M.B., F.R.C.S.[C.], F.I.A.A., F.I.C.S., of Regina died on October 4, 1956. In his passing the Saskatchewan profession has lost a veteran member, whose contributions stamp him as a leader and whose personal qualities have endeared him to all his colleagues. Born in Collingwood, Ont., in 1882, Sam Moore took his preliminary education in the schools at Wiarton and Chesley and graduated in medicine at the University of Toronto in 1908. After two years of postgraduate work in the United States he established practice in Regina in 1910. The community was then served by only 12 other doctors, and Dr. Moore may be regarded as a pioneer who grew up with the country. A skilled general surgeon, Dr. Moore served on the medical staffs of the Regina General and Grey Nuns' hospitals. His community activities included many years of contributions to the education of nurses, membership in the Rotary Club of Regina and a generation of leadership in Junior Red Cross affairs for crippled children. He represented the profession of Saskatchewan as a member of the Executive Committee of The Canadian Medical Association in 1926 and 1927. He was instrumental in initiating the movement which resulted in the formation of the Royal College of Physicians and Surgeons of Canada and was a Charter Fellow in Surgery. In 1952 he was honoured by elevation to the status of Senior Member in The Canadian Medical Association. In 1953 he received the Fellowship of the International College of Surgeons.

Vigorous and outspoken, Sam Moore retained his youthful enthusiasm for all good works. It was not always necessary to agree with him, because he loved an argument, but all who dealt with him gained a respect for his staunch integrity and acquired an affection for this worthy example of the good doctor.

DR. GEORGE LYMAN DUFF. We regret to record the death in Montreal on November 1 of Dr. George Lyman Duff, Dean of Medicine at McGill University and one of Canada's foremost pathologists and medical educators. An obituary notice and an appreciation will be published in the issue of December 1.

PROVINCIAL NEWS

MANITOBA

On October 3, Dr. Harry Coppinger, retiring superintendent of the Winnipeg General Hospital, was honoured at a dinner in the Royal Alexandra Hotel with Dr. C. B. Stewart, chairman of the Medical Staff, presiding. Arthur E. Johnston, on behalf of the Board of Directors, praised Dr. Coppinger's faithfulness and devotion to the hospital. Dr. Lennox Bell in a graceful speech mentioned his knowledge of all the employees and of the internal economy of the institution. Dr. Robert Cooke presented him with a desk set and a wallet containing five $100 bills. Dr. Coppinger served the hospital for almost 29 years, succeeding Dr. G. F. Stephens as Superintendent in 1942.

Dr. Leonard O. Bradley became Administrator of the Winnipeg General Hospital on September 1. Graduating in medicine from the University of Alberta in 1938, he served as intern in the Royal Alexandra Hospital, Edmonton, and then as resident in pædiatrics in Minneapolis for a year. After five years of war service he attended a course in Hospital Administration in the University of Chicago. In 1947 he was appointed Associate Professor of Hospital Administration, University of Toronto, and was editor of "Canadian Hospital" from 1950 to 1952. He became Administrator of the Calgary General Hospital in 1952 and served there until coming to Winnipeg. Recently he addressed the American Hospital Association on the care of the aged, a subject in which he is especially interested.

Kenneth Fisher, M.B., D.P.M., recently of Maudsley Hospital and Guy's Hospital, London, is now practising in the Department of Psychological Medicine of the Manitoba Clinic, Winnipeg.

Sir Geoffrey Keynes was present at a clinical luncheon in the Winnipeg General Hospital on October 10 and addressed a meeting of the Winnipeg Medical Society October 12 on surgery of the thymus gland.

ROSS MITCHELL

ONTARIO

Expenditure of up to $10,000 for air pollution research by the University of Toronto has been approved by the Metropolitan Executive Committee of Toronto. Violations of the smoke by-law have resulted in 47 court convictions during the first six months of 1956.

A new cardiovascular unit has been opened at the Toronto General Hospital. Mr. John T. Frame and Mr. John A. McFadyen donated funds for the building which houses the unit, and the Ontario Heart Foundation is supplying salaries for the technical and medical staff. Equipment was purchased with the co-operation of the federal and provincial governments.

Norma M. Huber, Banting Institute, won the Canadian Society of Laboratory Technologists' award for the best paper presented at the first North American Conference of Medical Laboratory Technologists, held in Quebec City. Her paper concerned work on the thyroid. More than 300 Canadian laboratory technologists attended the week-long meetings, along with many workers from the same field in the United States.

The Toronto Board of Education has named Thomas Martin to the new post of inspector of special classes. His territory includes Sunny View School for deaf children and those crippled by damage to the brain, three sight-saving classes in different schools, a class for the speechless and nine other special classes.

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The Red Cross Physical Medicine Centre, Windsor, has established a service for disabled homemakers. Housewives who suffer from crippling disabilities such as arthritis or stroke or from cardiac disease which has diminished their ability to do housework may be referred by their physician. During the counselling interview the main areas of difficulty in meal preparation, meal service, dishwashing, marketing, laundry, cleaning, sewing and child care are discussed. A home visit follows the interview, when practical suggestions are given. The height of the sink, table, working areas, shelves and their location often may be changed with advantage to the patient. Advice is given on a system of performing household chores which will spare energy and effort through better organization. The use of special assistive devices may be prescribed such as hand splints, suction cup plates, modified kitchen utensils, reaching tongs, and special wheel chairs to enable the housewife to perform a wider range of activities.

This service is similar to that given by the Department of Household Economics, Cornell University, and is the first such work we have heard of in Canada.

LILLIAN A. CHASE

The Ontario Heart Foundation plans to expand its postgraduate courses in heart disease which were introduced this year, Dr. R. F. Farquharson, Chairman of the Medical Committee of the Foundation, announced at the annual meeting. He said that "the extensive courses of instruction and clinical teaching of practitioners in three different areas in Ontario, conducted this year, proved to be very successful."

The courses, given by staff of the University of Toronto Faculty of Medicine and financed through the Heart Foundation by grants from the Provincial Department of Health, were given in Lindsay, Cobourg, Port Hope and North Bay. Local doctors attended the lectures and were able to bring heart patients with them for discussion and treatment. A day of general clinical instruction for doctors in these three districts was held in Toronto in April. Courses in electrocardiography for practitioners were given at the University of Western Ontario in London, Ontario.

Special units have been set up by the Foundation at Queen's University, the University of Western Ontario, the Hospital for Sick Children, Toronto, and the Toronto General Hospital.

QUEBEC

A unique reunion took place in Montreal on September 20 to 22. For the first time in its long history of accomplishments, the Montreal General Hospital played host to about a thousand doctors and nurses whose proudest boast was that they are graduates of one of this continent's greatest teaching hospitals. They came, not only from all parts of Canada, but also from every State of the United States and from Great Britain. The present staff of the hospital and, in fact, Montrealers generally joined in welcoming the home-comers warmly to the three-day round of professional and social activities.

Colonel W. W. Ogilvie, president of the hospital, in welcoming the alumni, emphasized that, while the physical plant was changed and greatly improved since the days when many of them interned in the old building on Dorchester St., the spirit of service to humanity remained the same. The visitors listened to many lectures and were given apt illustration of the progress medical science has made in recent years and of the vast amount of work still to be done. Alumni of earlier years actively participated in the program. For instance, Dr. W. G. Maclachlan, professor of medicine at the University of Pittsburgh, recalled that when he interned at the M.G.H. in 1903-07 the mortality rate from pneumococcal pneumonia was 21%. Later, when he went to Pittsburgh, it was as high as 50%. Diphtheria was common. Today a generation of young doctors is going into practice, many of whom have never seen, and probably will never see, cases of pneumococcal pneumonia and of diphtheria.

The building of the Montreal General Hospital is new, but its tradition is an old and cherished one of healing, preventive medicine, research and teaching. It is this that has made the M.G.H. an outstanding leader in its field—the spirit of the reunion, its illustrious graduates, reaffirmed this!

In Canada some half a million persons of all ages suffer from diseases of the heart and blood vessels in some form or other. Mortality statistics show that about one-third of all deaths are attributable to cardiovascular disease. The major problems are congenital heart defects, rheumatic heart disease, arteriosclerosis, high blood pressure and coronary heart disease. It is therefore encouraging to note that the Royal Victoria Hospital in Montreal and the Hôpital Sanatorium Laval in Quebec City are expanding and developing research activities into the causes of heart disease and new techniques of surgical treatment. This has been largely made possible by a federal grant totalling more than $117,000.

The staff of the cardiac unit in Quebec City will include Dr. Guy Drouin, Dr. Marcel Bilodeau, Dr. Fernando Hudon, Dr. J. P. Dechene, Dr. Maurice Beaulieu and Dr. J. A. Gravel. The work at the Royal Victoria Hospital will be under the over-all supervision of Dr. Donald R. Webster, surgeon-in-chief, Dr. Ronald Christie, recently appointed professor of medicine at McGill, and Dr. Arthur M. Vineberg.

McGill University is at present conducting a $6,000,000 campaign fund drive. This money will go entirely to undertake a five-point program of expansion. The University is simply "bursting at the seams" and space and facilities are needed to meet the anticipated increases in enrolment. For the Faculty of Medicine, the expansion program will provide renovation and extension of the Biological Building and the building of a first section of a great Medical Sciences Centre at Pine Avenue and Drummond Street to house biochemistry, pharmacology and physiology.

It is a pleasure to record that at the last annual meeting of the Graduates' Society of McGill, Dr. C. J. Tidmarsh, M.A. '22, M.D. '24, was presented with an honorary life membership, in recognition of distinguished service to his community and to his University. Dr. Tidmarsh has held office in the Graduates' Society continually since 1939, devoting his energy to almost all phases of the organization. He has been president of the Montreal Branch, president of the Society, graduate representative on the Board of Governors, and chairman of numerous committees.

The fourth annual Shepherd Lecture at the Montreal General Hospital, held in memory of Francis J. Shepherd, professor of anatomy at McGill from 1883 to 1913 and equally distinguished in surgery and dermatology, was delivered by Dr. C. P. Martin, professor of anatomy at McGill. His subject was "The teaching of anatomy in an expanding medical curriculum". He emphasized that anatomical knowledge is basic to all other medical sciences. Therefore, one cannot dispense altogether with anatomists. It is, however, getting harder all the time to attract promising young medical graduates to work in anatomy departments. Firstly, the road to prestige and public recognition in the newer medical sciences is more easily paved by publications and, secondly, the financial return does not compare to that available in practice, in industry, etc.

Dr. Martin held that a reduction in the amount of anatomy taught at the undergraduate level can only come as an increase takes place in teaching of the subject at the postgraduate level. So far there has been, if anything, a reduction in anatomy teaching at the postgraduate level. After all, some anatomical knowledge is necessary in all branches of medicine and very considerable anatomical knowledge is essential in some of the branches.

A. H. NEUFELD

creating new eating habits is the way to ensure permanent weight reduction

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BOOK REVIEWS

GLAUCOMA. A symposium organized by the Council for International Organizations of Medical Sciences, established under the joint auspices of UNESCO and WHO. Edited by Sir Stewart Duke-Elder. 350 pp. Illust. Charles C Thomas, Springfield, Ill.; The Ryerson Press, Toronto, 1955. $9.00.

Until it becomes superseded by a later work, this unique monograph will remain an authoritative treatise on the subject of primary glaucoma. Ophthalmologists in practice and in training will read and value it. Although its essential purpose is to encompass new work of immediate interest as related to established knowledge, and it is not intended to be a comprehensive textbook, there is little that is not covered in a stimulating and easily assimilable manner.

Seventeen formal papers, all dealing with different phases of the glaucoma problem, are presented and discussed by a group of 20 clinicians and research workers, selected for their preeminence in this field. Nine countries in Europe and the Western hemisphere are represented. The symposium is unique in showing a remarkable continuity, and the genius of the chairman, Sir Stewart Duke-Elder, is shown clearly in the organization and editing of the material. The various sections are of uniform excellence. The clinician will particularly enjoy the many informal and provocative discussions, which are a prominent feature. These attain a high scientific level and serve to align seemingly opposing theories into proper perspective.

The book will give its readers a knowledgeable understanding of the current status of primary glaucoma and will permit them to analyze critically miscellaneous contributions in the future.

CANCER CELLS. E. V. Cowdry, Director, Wernse Cancer Research Laboratory, Washington University, St. Louis, Mo. 677 pp. Illust. W. B. Saunders Company, Philadelphia, 1955. $16.00.

Everyone actively concerned with cancer today will be immediately attracted to a monograph on cancer cells by this eminent investigator and author. The title suggests a content of limited scope, yet while it deals essentially in fundamentals, the book offers a broader consideration of cancer which, to paraphrase the author, amounts to "what one person interested primarily in cells and their activities has to say about the entire cancer problem today."

Opening with a chapter on the general properties and characteristics of malignant neoplasms, the first third of the book gives an account of the recent acquisitions to our knowledge of the ultramicroscopic structures in the cytoplasm and the nuclei of tumour cells. The chapters on the chemistry of cancerous tissues and tumours in plants and animals act as a bridge to the largest segment of the work which is a series of reviews on experimental carcinogenesis and the factors in the susceptibility to human cancer. Dealt with later are the questions of cancer prevention, diagnosis and treatment, with a final chapter containing an historical review of cancer research up to the present day, and including the trends and problems to be faced by investigators.

The author's particular interest and opinions often show through the maze of factual information he has included in this book, and the concise summaries at the end of each chapter offer a refreshing relief from the complexities of the various subjects under discussion.

The book is well bound and the format provides for ease in reading and reference. The unified bibliography at the end is large, but includes nothing superfluous to accessibility to the literature. The illustrations, graphs and tables are clear and precisely adequate to the purposes they are meant to serve.

In this compilation of and commentary upon the pertinent reports of the investigations emanating from a great diversity of biological and medical disciplines, the author has undertaken the immense task of reviewing for each the significant advances in other fields so that they may perhaps broaden the basis for their mutual concern with the cancer problem. Where and to what degree the author falls short of attaining his objective will depend upon the points of view of the different readers. To bring out these deficiencies in the text comes more easily than giving the author the credit he justly deserves in providing medicine with a readable and clear presentation of the fundamentals upon which are based the current concepts of the nature of cancer.

FORTSCHRITTE DER KIEFER- UND GESICHTS-CHIRURGIE (Advances in Facio-Maxillary Surgery). Edited by K. Schuchardt and M. Wassmund. 268 pp. Illust. Georg Thieme Company, Stuttgart; Intercontinental Medical Book Corporation, New York, 1956. $14.30.

This is the second annual volume of papers given at the Congress of the German Society for Maxillo-facial Surgery. It contains almost all communications given at the meeting in July 1955 in Hamburg. The editors were anxious to collect these papers in one place, since maxillo-facial surgery embraces not only plastic surgery, but also dental surgery and otolaryngology. Hence the papers are apt to be scattered through three different specialties. Of the 60 communications included in this book, most are in German, but there are several contributions in English by American authors. The communications in German each carry a short summary of the paper in English; some of the summaries are admirable, but a few are expressed in very quaint English. The book is well illustrated, and those who wish to know what the maxillo-facial surgeons in Germany are doing will find the present volume a mine of information.

NORADRENALINE. Chemistry, Physiology, Pharmacology and Clinical Aspects. U. S. von Euler, Professor of Physiology, Faculty of Medicine, Karolinska Institutet, Stockholm. 382 pp. Illust. Charles C Thomas, Springfield, Ill.; The Ryerson Press, Toronto, 1956. $12.75.

This well-planned book in excellent English is a co-ordinated collection of all the work published on the primary amino-homologue of epinephrine (adrenaline), since the first synthesis of the drug in 1904, to which Professor von Euler contributed so much himself. Over 750 references are included in the text.

The introduction by Sir Henry H. Dale and the first chapter on "Historical Data" are most interesting and the other 13 chapters will delight the research worker, as will the numerous drawings, graphs and charts.

The scope of the book is best illustrated by the chapter headings—Chemical Properties; Formation and Inactivation, Metabolism; Preparation and Purification of Biological Material for Assay; Methods of Assay; Occurrence in the Suprarenal Medulla and other Chromaffin Cells; Occurrence in Nerves and Organs; Occurrence in Body Fluids; Physiological and Pharmacological Actions; Release from Adrenergic Nerves; Suprarenal Medullary Secretion; Excretion in Urine; Nor-adrenaline in Chromaffin Cell Tumours and Sympathoblastoma; Therapeutic Use of Nor-adrenaline.

This book is written primarily for workers in the basic sciences but is also valuable to the internist, surgeon and anæsthetist as a reference text.

CONTEMPORARY PSYCHOTHERAPISTS EXAMINE THEMSELVES. W. Wolff, Professor of Psychology, Bard College, Annandale-on-Hudson, N.Y. 299 pp. Charles C Thomas, Springfield, Ill.; The Ryerson Press, Toronto, 1956. $7.50.

The author of this book interviewed 43 representatives of various psychotherapeutic schools practising in and around New York and put to them a number of questions about their work. They were asked, for example, which type of psychotherapy they considered best and why, whether this type of therapy could be applied to all psychogenic disorders, what their criticisms were of certain standard types of therapy, and in what way they felt they could modify the therapy. They were also asked about their technique, including questions on such subjects as the use of dreams, free associations and transference. They were asked to estimate their success and also to discuss the personality factors in their patients and in themselves. Of the 50 persons selected for interview, only 43 granted an interview and eight of these subsequently withdrew the transcript of their talk with the author. Of the remaining transcripts about half are reproduced here; these are representative of many different schools of psychotherapy, such as Freudian, Adlerian, and Jungian therapy, hypnotherapy and group therapy. The first half of the book gives a verbatim record of the interviews and the second half of the book gives a general evaluation of the study, based upon answers received in the total number of questionnaires. The results are interesting in showing the differences and also common factors in the schools of psychotherapy.

THE MORPHOLOGY OF HUMAN BLOOD CELLS. L. W. Diggs, Professor of Medicine and Director of Medical Laboratories, University of Tennessee; Dorothy Sturm, Instructor, Memphis Academy of Arts; and Ann Bell, Instructor in Medicine, University of Tennessee, Memphis. 181 pp. Illust. W. B. Saunders Company, Philadelphia and London, 1956. $12.00.

In the preface to this atlas it is stated that the book is intended primarily for "medical students and student technologists who for the first time are learning about the morphology of normal and pathological cells, for medical technologists who daily examine blood smears in physicians' offices, clinics and hospitals, and for physicians who supervise laboratories".

The authors have admirably fulfilled their purpose. The plates are painted beautifully in water colour and the detail of nuclei and cytoplasm is carefully reproduced. The colour plates are supplemented with black-and-white and colour photographs, ink drawings, tables and descriptions so that the student can interpret the plates by reference to the supplementary illustrations with ease.

The authors have stressed "differential morphology" and further selected the "cells which are most representative". In this way the student is given an excellent basis for the introduction to a field of cell study that ordinarily presents a very confusing picture to the beginner, with the numerous variations in cell size, shape and staining reactions.

Thin smears of peripheral blood and bone marrow mainly stained by Wright's method provide the material used for the illustrations. Because of the detail presented in the illustrations the atlas should also be a most helpful reference for workers doing research on developmental history and behaviour of blood cells.

Certain details in the text, however, do not seem so well chosen. The term thrombocyte is used instead of platelet. This is confusing as thrombocytes generally are considered cells characteristic of blood of vertebrates other than mammals. Further, Dr. Diggs describes normal mitosis as being found in blood cells but in the illustrations he shows only two examples on Plate XI A and in Fig. 32, C, both of which are not very clear.

On page 113 he states that nuclear clefts are due to incomplete cell division "during the process of mitoses". The reviewer cannot agree with this idea, as blood cell development cannot be explained on the basis of ordinary mitosis and no one has as yet adequately described blood cell cytogenesis.

Aside from such objections, the atlas is a most valuable book that every worker interested in blood cells needs.

THE NEUROSES IN CLINICAL PRACTICE. Henry P. Laughlin, Assistant Clinical Professor of Psychiatry, George Washington University School of Medicine, Washington, D.C. 802 pp. W. B. Saunders Company, Philadelphia and London, 1956. $12.50.

On the whole, this is an excellent book and recommended reading for any student in psychiatry. The breakdown into chapters, headings and sub-headings is very well done and makes it easy to read. The same may be said for the variability of the printing size and type which permits the author to emphasize and delineate areas which he regards as important. At the same time, other areas which may be of less importance or of special interest can be included without detracting from the general text.

While the general presentation is from an analytical point of view, the author has made a very good effort to define analytical terminology of common usage in a comprehensible way. There is very little evidence of any particular bias in this controversial field. There is, in fact, even a recognition that there are other points of view and approaches to the problem of understanding psychiatric patients which are quite valuable and important. There are some interesting but refreshingly objective references to the historical development of psychiatry. Freud remains quite properly the father of modern psychiatry, but the contributions of his teachers and colleagues are not ignored.

As in any book of this magnitude, there are several minor errors and discrepancies. These will, however, be easily discovered by a discerning reader and should prove of no serious consequence. There are also some major areas of disagreement as far as the various schools of psychiatry are concerned. However, the author has made an honest and apparently successful effort to present an approach to clinical psychiatry which is generally acceptable.

Canad. M. A. J.
Nov. 15, 1956, vol. 75

SURGERY OF THE EYE: DISEASES. A. Callahan, Birmingham, Alabama. 447 pp. Illust. Charles C Thomas, Springfield, Ill.; The Ryerson Press, Toronto, 1956. $27.50.

This comprehensive book on eye surgery is approximately twice as long as its well-known companion volume "Surgery of the Eye: Injuries," written by the same author and published by Thomas in 1950. Although it deals mainly with problems resulting from diseases and congenital anomalies, it has a 36-page appendix on recent advances in the management of injuries of the eye and its adnexæ, which brings the material in the first book up to date. The two books, when taken together, cover the whole field of ophthalmic surgery.

Dr. Callahan writes from a vast personal experience and from an obviously intimate knowledge of the present status of eye surgery throughout the world. In addition, he has not hesitated to enlist the aid of other outstanding authorities.

While frequently presenting the reader with a choice of surgical procedures, he clearly expresses his own preferences and has wisely omitted those procedures which he himself has found to be unsound.

Repeated revisions have resulted in a text that is thoroughly up-to-date, a difficult feat in a field where changes are taking place so rapidly. Discussions of the newer analgesic and tranquillizing agents, the newer local anæsthetics, and the newest suture materials are included. Recently revived acrylic tube methods for restoration of lacrimal drainage, the newer modifications of goniotomy, the use of EDTA for the dissolution of calcified corneal opacities, techniques of scleral shortening (including scleral buckling) and the use of vitreous implants in detachment of the retina, the present status of motility implants, and many other advances in eye surgery, are well covered.

The book is beautifully prepared. The clarity of the text, enhanced by superb illustrations, leaves little to be desired.

It is unavoidable that some procedures of value have been omitted, that agreement with the author's recommendations will not always prevail, and that in the case of some procedures (notably keratoplasty) more highly specialized monographs will be required. However, this book with its companion volume must be ranked as one of the best, and certainly the most up-to-date, of the general texts on eye surgery. No ophthalmic surgeon will want to be without it or will fail to benefit from referring to it repeatedly. Dr. Callahan has performed a major service to ophthalmology in a difficult field, and it is to be hoped that future revisions will follow.

THE LAST STITCH. W. L. Crosthwait and E. G. Fischer. 250 pp. J. B. Lippincott Company, Philadelphia and New York; Longmans, Green & Co., Toronto, 1956. $4.00.

This is the story, told without embellishment and in simple anecdotal style, of an exceptional doctor and an exceptional man. William L. Crosthwait was born in Mississippi in 1873 and is still in active surgical practice at the age of 83, with a clear brain, a steady hand, and an obviously undiminished zest for life, though he admits to getting tired if he has to stand for a long time in the operating room.

His title stems from the remark of a relative of an old lady on whom Dr. Crosthwait was performing one of his first abdominal operations in 1898—"If anything happens to Aunt Bess, Doc done took his last stitch." The whole book is shot through with the sort of humorous anecdote that a doctor of the old school in pioneer country might be expected to accumulate. He recalls the deacon's request to the Lord at the funeral, on behalf of the deceased—"Please take care of him. He left his family well fixed and they can take care of themselves. Amen." As a poor boy with a copy of Gray's Anatomy and an itch to acquire anatomical specimens, he asked the old man in charge of a small railway hospital what they did with all the arms and legs they cut off after railway accidents. The old man said, "Well, it's like this. We generally keeps 'em an' buries 'em wid de patients."

But the book isn't just another collection of medical humour. It reveals a person of vast courage, vast enterprise (it took him years to save the money to get to a medical school, and he was constantly leaving his practice to make up for the gaps in his education by taking postgraduate courses in Chicago, Rochester, New York and elsewhere), and unblemished integrity. And the book is full of sound advice, even though Dr. Crosthwait asserts modestly that he has none to give to the new generation of doctors. He spent the first ten years of his career in a small country town in Texas, thus acquiring a great respect for the country doctor, and then moved into the city to become a surgeon in an age when the cuttings and shootings of the local inhabitants gave a surgeon much practice. His golden rules of surgery are absolutely basic: not to advise an operation he would not be willing to have done on himself and not to operate unless satisfied that there is no one more competent within reach.

This colourful book makes exciting reading, and it might well be recommended to medical students as part of their course of medical ethics. It also casts light on the type of man who made the United States a powerful nation. His own story enforces Dr. Crosthwait's plea to physicians to take a more active part in local politics. The local precinct, he says, is the place to get started on the things that a doctor would like to see done. And he's probably right.

MASKED EPILEPSY. H. R. E. Wallis, Consultant Pædiatrician, Bath Clinical Area Medical Officer, England. 51 pp. E. & S. Livingstone Ltd., Edinburgh and London; The Macmillan Company of Canada Limited, Toronto, 1956. $1.20.

This book deals with some of the disturbances due to epilepsy which are not evident as frank convulsive attacks, the so-called epileptic equivalents.

In this book the author includes those equivalents which have already been generally accepted and recognized, such as recurrent headaches, abdominal pain, cyclical vomiting, disturbances of sleep, nightmares, personality changes and episodes of abnormal behaviour. However, he also includes a larger group which are not commonly accepted and which are in many ways doubtful. These include sweating, pyrexia, abnormal fears and day terrors in children, the three-month colic in infants, sudden cardiac arrest and failure to gain weight.

It is an interesting book to read. Its greatest value is in the emphasis on broader concepts of convulsive disorders. On the other hand, however, there is considerable evidence of a non-critical evaluation of the material. This latter is perhaps most evident in the author's conclusion that phenobarbitone is a specific for epilepsy, and that any symptoms controlled by this drug must be epileptic in origin. He fails to accept the fact that the drug may be acting primarily as a sedative and that the cessation of symptoms may be due to reduction of emotional tension rather than to correction of convulsive tendencies. Throughout the book one finds evidence that the author's concepts have already been criticized in his own country. One cannot help feeling that much of this criticism is justified.

SURGERY OF THE HAND. S. Bunnell, Honorary Member. American Academy of Orthopedic Surgeons. 1079 pp. Illust. 3rd ed. J. B. Lippincott Company, Philadelphia and Montreal, 1956. $22.50.

Appearing after a lapse of eight years since the previous edition of this authoritative classical work, this new third edition is indeed welcome. The length of the book has been increased by over 300 pages but the general format and the chapter headings are essentially the same. The whole book has been brought up to date. The section on pedicled skin grafts has been doubled. The chapter on injuries of the hands has been revised and improved.

This book is based on an extensive and critical experience in this field. It should be in the library of every surgeon who is called upon to deal with any hand surgery.

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PRESENT STATUS OF TUBERCULOSIS THERAPY

In the *Journal of the American Medical Association* for September 29, 1956, there appears the seventh report by the Veterans Administration group that has been studying the chemotherapy of tuberculosis since 1946. The report is directed primarily towards the internist and general practitioner of medicine. Three basic chemotherapeutic regimens have been compared: 1 g. streptomycin twice a week, plus 12 g. of PAS given daily; 1 g. streptomycin twice a week, plus 0.3 g. isoniazid daily; 0.3 g. isoniazid, plus 12 g. PAS daily. In less extensive disease all three regimens gave approximately the same good results; where disease was more advanced, the best results were obtained with the combination of isoniazid and PAS.

Another series of patients were given streptomycin plus isoniazid plus PAS; results showed little difference from the two-drug regimens, except that there was more bacteriological conversion with streptomycin plus isoniazid, or with the three-drug combination. Administration of 1 g. of streptomycin plus isoniazid daily leads to less emergence of organisms resistant to isoniazid than does administration of 1 g. streptomycin twice a week, with isoniazid daily. It is generally agreed that drug therapy should continue for at least a year in all cases, and for no less than six months after achievement of clinical control of the disease.

The report shows inconclusive results on the value of bed rest, but all are agreed that the patient should at first be treated in hospital.

Combination of pyrazinamide with isoniazid has been shown to be effective in patients, though there appears to be a toxic effect on the liver in approximately 10% of patients. The toxic effect is, however, apparently reversible. Cycloserine alone is inferior to the isoniazid-PAS combination; cycloserine plus isoniazid may be an effective regimen. Toxicity to the central nervous system has been reported.

Other parts of the report deal with thoracic surgery, non-pulmonary tuberculosis and special problems. It is apparent that no rule of thumb can be given for chemotherapy of all patients with pulmonary tuberculosis.

HYPNOSIS IN ANÆSTHESIOLOGY

A case of thoracotomy and resection of the lingula pulmonis under hypnosis with additional basic medication is reported from California (*J. A. M. A.*, 162: 441, 1956). The patient had previously undergone bronchoscopic examination under hypnosis. Before the major operation the patient was hypnotized on the previous night; she was given pentobarbital and Benadryl the next morning, followed by meperidine (Demerol) and scopolamine. Hypnosis was then begun and the patient taken to the operating room half an hour later when a deep hypnotic level had been obtained. An endotracheal tube was inserted, some thiamylal (Surital) was injected intravenously to stop swallowing, and the skin was infiltrated with procaine. Suggestion was continued throughout the procedure. The patient responded to all commands during the operation, except that she should hold her breath. Posthypnotic suggestion was given to the effect that postoperative discomfort would be minimal; the postoperative course was uneventful. It is suggested that posthypnotic suggestion is perhaps the single most valuable phenomenon associated with hypnosis. The incidence and severity of nausea and vomiting after operation may be lowered by this, as well as the level of postoperative pain.

AN EVALUATION OF SPLENIC PUNCTURE

Shields and Hargraves (*Proc. Staff Meet. Mayo Clin.*, 31: 440, 1956) have made a study of splenic puncture at the Mayo Clinic, as applied to hæmatological diagnosis. They define a "normal" splenogram, based on a count of the 5,000 nucleated cells in preparations from five control splenic punctures done on each of four histologically normal spleens removed in the course of surgical procedures. Splenograms were determined also on the material aspirated from 60 patients with a

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clinically enlarged spleen. Analysis and correlation of these data indicate that splenic puncture was diagnostic in 15%, that it was confirmatory or helpful in 33.3%, contributed no diagnostic information in 35%, added confusion in 11.7% and was definitely misleading in 5%. This evaluation is based upon a clinico-pathological study of patients followed up for a period of one to four years.

The finding of more than 90% lymphocytes in the splenogram is not a reliable criterion for diagnosis of lymphocytic lymphoma. Of the patients in this series with this percentage of lymphocytes 11.6% had other conditions, whereas one control puncture of a normal spleen showed 95.4% lymphocytes. Recognition of atypical or malignant cell types may be diagnostic. There was a close correlation between myeloid immaturity in the peripheral blood smear and myeloid immaturity in the splenic aspirate of myeloid metaplasia, making splenic puncture seem unnecessary in such cases.

In the control splenic aspirate the ratio of granulocytes to lymphocytes showed such variation that too much diagnostic significance should not be attached to this ratio, though the ratio of reticular lymphocytes to mature lymphocytes seems to be significant. The normal splenogram shows an average ratio of 0.07 with a range of 0.02 to 0.14 (variations based on study of 20 punctures from four histologically normal spleens).

A decrease in relative numbers of reticular lymphocytes seems to be associated with hæmolytic disease, while high numbers of reticular lymphocytes in the ratio were usually found in conditions without hæmolytic disease.

A good correlation seems to exist between myeloid activity of the bone marrow and the ratio of reticular lymphocytes to mature lymphocytes in the splenic aspirate. Of 13 patients having low ratios of reticular lymphocytes to mature lymphocytes, seven had hypoplastic or fibrotic marrows and four had hyperplastic marrows. Conversely, of nine patients having an elevation of the ratio of reticular lymphocytes to mature lymphocytes, six showed hyperplastic marrows, and three normal cellularity. Several patients having clinical hypersplenism showed an abnormally high ratio of reticular lymphocytes to mature lymphocytes, suggesting that hypersplenism may be associated with both a relative and absolute increase of reticular or immature lymphocytes in the spleen. A low ratio was found with myelofibrosis associated with myeloid metaplasia of the spleen.

RESEARCH PRIZE IN DERMATOLOGY

The Canadian Dermatological Association announces the establishment of a research prize in dermatology for the best essay submitted of original work, not previously published, relative to some fundamental aspect of dermatology and syphilology. Com-

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petition for this prize will be open to any dermatologist, or full-time student in dermatology, in Canada, but not later than five years after receiving certification or its equivalent in dermatology.

The prize will consist of an award of $100 and an opportunity to read the winning paper before the next annual meeting of the Canadian Dermatological Association. The award will be made by a committee selected to pass on the essays by the Canadian Dermatological Association, and the decision of the judges will be final. The decision will be based on the originality of the ideas presented, the potential importance of the work, the experimental methods and controls used, the evaluation of the results and the clarity of presentation. The award is planned as an annual one, but if in the opinion of the judges no paper worthy of an award is presented, none will be given. For further information apply to Dr. Barney Usher, 1538 Sherbrooke St. W., Montreal 25, Quebec.

SYSTEMIC LUPUS ERYTHEMATOSUS

Dubois (*Ann. Int. Med.*, 45: 163, 1956) reviews his experiences in diagnosis and treatment of 163 cases of systemic lupus erythematosus over a six-year period at the Los Angeles County General Hospital. The following significant points have been demonstrated:

The apparently increasing incidence of this disease is a function of the more frequent usage of the L.E. cell test and the concept of a much broader spectrum of systemic lupus erythematosus, which is a chronic disease resembling rheumatoid arthritis. Part of the rising incidence is also due to the development of more sensitive techniques of L.E. cell detection.

Simultaneous L.E. cell studies were performed on 44 patients with systemic lupus erythematosus by four different methods, utilizing two concentrations of heparin as an anticoagulant, a clotted method, and the recent Snapper ring technique. In 10 cases the clotted method was the only positive test of the battery; in four the ring technique was the only positive test, and in two cases the heparinized specimen was the only positive one. With increasing amounts of heparin fewer L.E. cells were found. At least three different types of L.E. cell tests should be performed to screen a suspected case adequately. Despite these refinements, L.E. cells are not found in all patients with the disease.

A study of the natural history of a large series of cases gives the best concept of the course of the illness. Of this series, 38.6% have had spontaneous remissions prior to any special therapy. Certainly many of the treated patients would have had remissions without treatment. Six per cent of the series had at least two remissions, and 16% three or more. This makes evaluation of therapy difficult.

Antimalarial drugs have a definite place in the treatment of systemic lupus erythematosus, particularly in the milder cases. Their effect on the cutaneous lesions is almost specific. The arthritis is also greatly benefited. Their synergistic use with steroids often

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reduces the steroid dose and may permit one to stop steroid treatment entirely. Eighty per cent of the milder cases are benefited by antimalarials alone.

Steroid therapy is still the mainstay of treatment in the acutely ill patient, and benefits 90% of the patients so treated. Nitrogen mustard has been shown to ameliorate the nephropathy of systemic lupus erythematosus, particularly in the more œdematous patients. The lives of these patients are prolonged by this form of therapy. The median duration of life of 59 untreated or inadequately treated patients at this hospital was 24 months. In the present series of 138 adequately treated patients ill for 24 months or more, less than 10% have died. This difference is significant.

MEDICAL HISTORY

It is announced that a new quarterly journal, *Medical History*, is to be published from January next by Messrs. William Dawson & Sons (4 Duke Street, Manchester Square, London, W.1, England). This international journal is intended to provide a medium for papers on all aspects of history and bibliography of medicine and allied sciences. The annual subscription will be £2.10.0. It is hoped to review an issue of this journal at a later date.

MODERN TREATMENT OF THE MALABSORPTION SYNDROME IN ADULTS

Finlay and Wightman (*Ann. Int. Med.*, 45: 191, 1956) describe the results of treatment of 27 patients with intestinal malabsorption by means of oral cortisone or a gluten-free diet or both. Fifteen of these patients had idiopathic disease, and 12 some pathological process in the gastrointestinal tract. Unsatisfactory results were obtained in one patient with tropical sprue (on cortisone), and in two patients with secondary malabsorption whose underlying disease was progressive.

Satisfactory improvement occurred in the remaining patients of both groups. Fat absorption improved, with restoration to normal values in four patients. Carbohydrate absorption, as judged by the xylose tolerance test, also improved. The clinical and biochemical responses of several patients suggest that absorption of hæmatopoietic factors, calcium and vitamin K is also improved. The response to cortisone appears to be more rapid but less complete than that to a gluten-free diet. Combination of the two treatments appears to be advantageous in severely ill patients.

TRANSLATION OF RUSSIAN MEDICAL LITERATURE

The National Institutes of Health of the U.S.A. has established a new program to help American scientists keep up to date on Russian medical research findings. Plans call for the translation and distribution of Soviet scientific medical information in the biological and medical sciences. Objectives of the program are similar to that of the National Science Foundation in the field of the physical sciences. Funds totalling $250,000 were earmarked by the last Congress in the National Institutes of Health appropriation for this purpose.

The program will include support for the republication in

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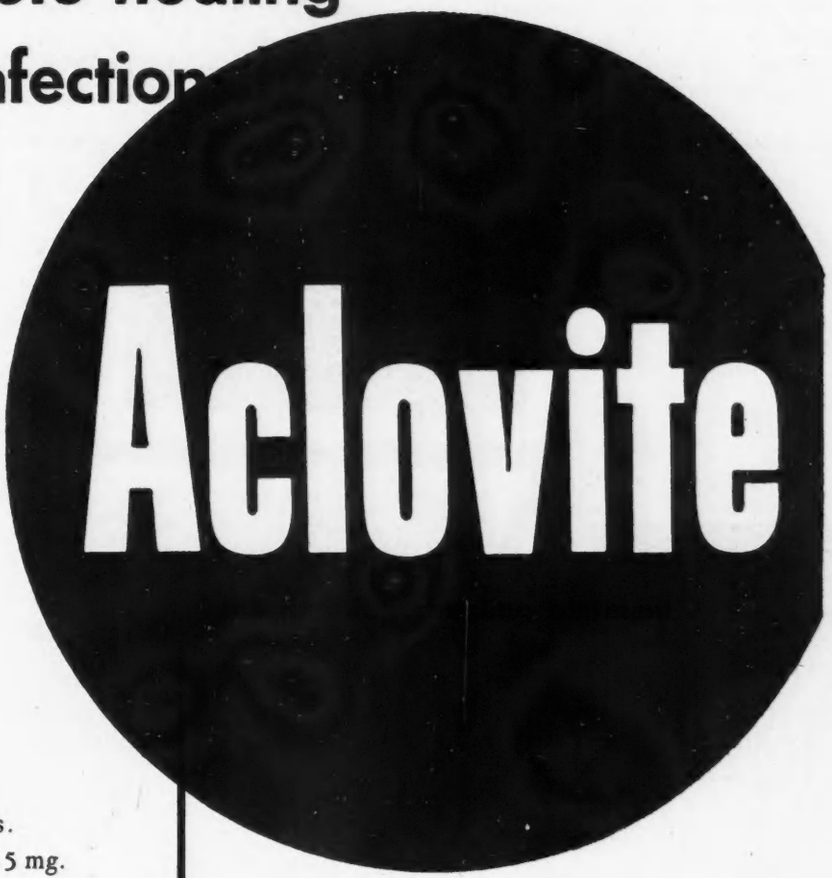
To promote healing where infection



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English of several representative Soviet journals and other Russian scientific publications. These will be distributed by the National Institutes of Health to medical and scientific libraries and to government agencies. These translated journals will also be made available for purchase. The first two Soviet journals selected under the new program are *Biokimiia* (Biochemistry) and *Biulletin 'Eksperimental-'noi Biologii i Meditsiny* (Bulletin of Experimental Biology and Medicine).

A second feature of the program calls for the translation of sections of *Sovetskoe Medetsinskoe Referativnoe Obozrenie* (Soviet Medical Reference Review), an extensive abstract journal wholly devoted to Soviet contributions. The four sections provisionally selected for translation and publication are: Microbiology and Infectious Diseases; Normal and Pathological Physiology, Biochemistry Pharmacology, Toxicology; Oncology; and Internal Diseases.

The third aspect of the program involves the selection of a limited number of monographs for translation and publication. Selection will be made by a special committee of scientists assembled for this purpose. Additional suggestions for significant Russian-language monographs are solicited by the National Institutes of Health from U.S. scientists.

Publication of a Russian-English medical dictionary and of a directory of Soviet medical and biological research institutes is also being planned.

BORDER-CROSSING BABIES

After four years of study a committee of the Canadian Welfare Council has consolidated its views on the complex subject of adoption where the child and the prospective foster parents live in different provinces or different countries. "A Policy Statement on Adoption Across Borders" is the title of a six-page folder epitomizing this study which incorporates the principles of good adoption practice. Physicians who are interested in the problems of adoption will find this brochure informative, and they may recommend it with confidence to childless couples who consult them. Copies at ten cents each may be obtained from the Publications Department, The Canadian Welfare Council, 55 Parkdale Avenue, Ottawa 3.

HUMAN TOLERANCE TO INSECTICIDES

The U.S. Food and Drug Administration announced on October 23 that new scientific evidence re-

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quires it to tighten safety controls over residues of organic phosphate insecticides used on food crops. Additional scientific testing will be needed to obtain official "tolerances" for sprays and dusts containing these chemicals. It has been found essential to test the organic phosphate insecticides for "potentiation" of toxicity in mixtures. Some organic phosphate insecticides may greatly increase the toxicity of others when they are fed to animals simultaneously. For example, it takes 50 parts per million of EPN in the diet of dogs to produce a noticeable effect; it takes 250 parts per million of malathion to produce a noticeable effect; but when only 20 parts per million of EPN and 100 parts per million of malathion are fed simultaneously, the combination is quite toxic to the test animal.

Both EPN and malathion are used on food crops, and slight residues of them are permitted on certain commodities when they are marketed. However, the official government tolerances do not permit them to be present simultaneously in concentrations that would be toxic.

Commissioner Larrick said, "In considering a petition for a tolerance or tolerances for an organic phosphate pesticide, the Food and Drug Administration will require experimental evidence showing the toxicity of the compound when fed to test animals with each of the other organic phosphate pesticides which has a tolerance at that time. This requirement will be relaxed if additional scientific evidence shows it can be done without hazard to the public health."

There are official tolerances in effect now for five organic phosphate pesticides: parathion, methyl parathion, malathion, EPN and Systox. The new requirements will make it harder for pesticide chemical manufacturers to get new tolerances. For example, a firm that wishes a tolerance for a new compound in this group will have to determine its toxicity alone, and its toxicity when it is combined with each of the five other organic phosphates that already have tolerances.

CANADIAN ARTHRITIS AND RHEUMATISM SOCIETY

In the September issue of the *Newsletter,* the Canadian Arthritis and Rheumatism Society announces the release of a documentary film, the first educational film they have prepared, designed to further public understanding of arthritis. The film, entitled "Never Surrender", is a 27-minute 16-mm. sound film in full colour, photographed entirely in British Columbia and Alberta but depicting typical scenes in the work of a C.A.R.S division. The cast includes professional actors, patients and medical staff. The C.A.R.S. also announces that it will continue to distribute its *Bulletin on Rheumatic Diseases* to interested doctors in Canada during 1956-57. This service will be provided to any Canadian doctor on request. The establishment of new branches in the Maritimes is described, and also an extension of mobile physiotherapy services in Saskatchewan and Manitoba. The award of an honorary fellowship of the Royal College of Physicians, London, England, to Dr. Wallace Graham, chairman of the Society's National Medical Advisory Board, is also announced. Attention is drawn to the fact that the National Office of the C.A.R.S. is now at 900 Yonge Street, Toronto 5, and the telephone number is WAlnut 4-8353.

AERO MEDICAL ASSOCIATION 1957 MEETING

Medicine in the jet-atomic age of flight will be the central theme of the 28th annual meeting of the Aero Medical Association at the Shirley Savoy Hotel in Denver, Colorado, May 6 to 8, 1957, under the presidency of Dr. Jan H. Tillisch, Rochester, Minnesota, medical director of Northwest Airlines.

The scientific program will include reports on emergency escape from high-performance aircraft, new developments in airline passenger comfort and safety, and current research in manned space satellites. The American Board of Preventive Medicine will conduct examinations for certification in aviation medicine in Denver from May 3 to 5.

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MEDICAL NEWS *in brief*

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Special events include the third Louis H. Bauer Lecture and an extensive display of scientific exhibits. The first recipient of a new aeromedical medal, sponsored by Charles Pfizer and Company, will also be announced. The president-elect, Dr. Ashton Graybiel, research director of the U.S. Naval School of Aviation Medicine, Pensacola, Florida, will be installed in office at the annual banquet on May 8.

Dr. Nolie Mumey, Denver, is general chairman of the meeting. Speakers desiring to participate in the scientific sessions should send the title of the proposed paper and a 150-word abstract before December 1 to Dr. E. J. Baldes, Chairman of the Scientific Program Committee, Mayo Clinic, Rochester, Minnesota.

CHICAGO LECTURES ON HISTORY OF SURGERY

The International College of Surgeons through its School of the History of Surgery and Related Subjects has inaugurated a series of lectures on the history of surgery. They will be presented in the Surgeons Hall of Fame, 1524 Lake Shore Drive, Chicago, and are open to physicians and medical students. Dr. Leo M. Zimmerman gave the first lecture on October 23, on "The Beginning of Surgery and the Edwin Smith Papyrus". Other lectures in the series will take place on November 13, December 4, January 8 and 29, March 1, April 2 ("British Anatomists and Surgeons", Dr. Lloyd G. Stevenson, Professor of the History of Medicine, McGill University, Montreal), April 23 and May 14.

1957 SCHERING AWARD CONTEST

The subjects of papers for the 1957 Schering Award Contest for medical students are: (1) Incidence of Various Types of Cardiovascular Diseases by Age Group in the Male and the Female; (2) Recent Trends in Corticosteroid Therapy for Ocular Disorders; (3) Recent Advances in the Biochemical Aspects and Treatment of Mental Disease. Literature and entry forms are being distributed in medical schools. Students interested in participating should submit their entry forms by January 1, 1957. This year double the amount is available in cash awards. A $1,000 first prize and a $500 second prize will be awarded for the best papers on each of the three selected topics. There are also awards for other outstanding papers. Announcements of results of the contest will also be speeded up; winners should be informed by November.

CLEVELAND HEALTH MUSEUM

The Cleveland Health Museum in Cleveland, Ohio, is an outstanding collection of visual aids and other reference material for health education of the public. The Museum has recently published a catalogue entitled "How to Make Health Visible", available from Cleveland Health Museum, 8911 Euclid Avenue, Cleveland 6, Ohio, at $1.00 per copy. This well-produced document includes a listing and illustrations of exhibits in various aspects of human biology, obstetrics, growth and development, nutrition, school health and general medicine and public health. Many of these exhibits may be had on loan at a fee, and a reference library is also available.